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1926-27.

LEGISLATIVE ASSEMBLY.

NEW SOUTH WALES.

REPORT

OF THE

DIRECTOR-GENERAL OF PUBLIC HEALTH,

NEW SOUTH WALES,

FOR THE YEAR 1925.

Printed under No. 1 *Report from Printing Committee,* 23 *December,* 1926.

SYDNEY: ALFRED JAMES KENT, GOVERNMENT PRINTER.

1927

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Legislative Enactments.

The Minister of Public Health is charged with the administration of the Acts noted hereunder, execution of which is left to the Director-General of Public Health and the staff working under his control:—

Cattle Slaughtering and Diseased Animals and Meat Act, 1902.
Dairies Supervision Act, 1901.
Diseased Animals and Meat (Amendment) Act, 1910.
Food Preservation by Sulphur Dioxide Enabling Act, 1920.
Noxious Trades Act, 1902.
Nurses Registration Act, 1924.
Private Hospitals Act, 1908.
Public Health Act, 1902.
Public Health (Amendment) Act, 1915.
Public Health (Amendment) Act, 1921.
Public Health (Night-soil Removal) Act, 1902.
Pure Food Act, 1908.
Venereal Diseases Act, 1918.
Closed Cemeteries and Exhumation of Bodies for the purpose of re-interment, &c.

Branches and Institutions controlled by the Director-General of Public Health:—

Executive and Clerical Staffs.
Epidemic and Sanitary Inspectorial Branches.
Microbiological Laboratory.
Chemical Laboratory.
Pure Food Branch.
Dairies Supervision and Cattle Slaughtering Inspection Branches.
Government Medical Officers for Sydney.
Industrial Hygiene.
Maternal and Baby Welfare.

State Hospitals and Asylums, Convalescent Homes, and Sanatoria, including:—

Coast Hospital, for General and Infectious Cases.
Leper Lazaret.
David Berry (General) Hospital.
Montrose Maternity Hospital, Burwood.
Fernleigh Rest Home (Pre- and Post-Maternity), Ashfield.
Lady Edeline Hospital for Babies, "Greycliffe," Vaucluse.
Strickland Convalescent Home for Women, "Carrara," Rose Bay.
Denistone Convalescent Home for Men, Eastwood.
Waterfall Sanatorium for Consumptives.
Rookwood State Hospital and Asylum (Men).
Liverpool State Hospital and Asylum (Men).
Newington State Hospital and Asylum (Women).

Parramatta Homes:—
(*a*) Macquarie-street Asylum for the Blind, and for Men suffering from Defective Sight and Senility.
(*b*) George-street Asylum for Aged and Infirm Men.

Members of the Board of Health.

Dick, Robert, M B., Ch.M., D.P.H., Director-General of Public Health (President).

Paton, Robert Thomson, C.M.G., F.R.C.S., Edin, M.D. Brux., Member, Board of Health.

Robinson, Augustus Frederick	Member,	Board of Health.
Purser, Cecil, M.B., Ch.M.	do	do
Chairman, Chamber of Commerce	do	do (*ex officio*).
The Right. Hon. the Lord Mayor	do	do (*ex officio*).
Fegan, The Hon J. L.	do	do
Armstrong, Wm. George, M.B., D.P.H., ...	do	do
Wall, The Hon. Frank Edgar, M.D., M.L.C.	do	do
Maincke, Mrs. Euphemia Jean	do	do

Head Office Staff.

Dick, Robert, M.B., D.P.H. ...	Director-General of Public Health.
Morris, E. S., M.D., Ch.M., D.P.H....	Senior Medical Officer of Health and Director of Maternal and Baby Welfare.
Purdy, John Smith, M.D., D.P.H. ...	Medical Officer of Health, Metropolitan Combined Districts.
Wallace, H. G., M.B., B.S., D.P.H....	Medical Officer of Health, Hunter River Districts.
Suckling, Frank Martin, M.B., D.P.H.	Assistant Medical Officer of Health.
Palmer, Arthur Aubrey, M.B., Ch.M.	First Government Medical Officer for Sydney.
Gibbes, Alexander Edward, M.B., Ch.M.	Second do do
Mackay, Robert Mitchell, M.D. ...	Third do do
Badham, Charles, B.Sc., M.B., Ch.M.	Medical Officer of Industrial Hygiene.
Neely, Thomas Henry	Secretary.
Potter, James Julius	Chief Clerk.
Ranshaw, John James	Acting Accountant.

Clerical Staff, 16.

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REPORT of the Director-General of Public Health to the Honorable the Minister of Public Health.

Sir,

I have the honor to present my report for the year 1925. In concluding my summary in 1924 of some of the important matters needing attention, I stressed the urgency of the following :—

1. *Tuberculosis.*—Need for a properly co-ordinated scheme to be brought into operation.
2. *Baby and Maternity Welfare.*—The desirability of these activities being brought under direct medical supervision and controlled by this office; and it was pointed out that the subjects of ante-natal supervision and improvement in maternity practice pressed for urgent and comprehensive action.
3. The division of the State into health districts under supervision of whole-time medical officers of health.
4. *Venereal Diseases.*—The need of additional clinics in the metropolitan district, and particularly the establishment of a clinic in the large shipping and industrial centre at Newcastle.
5. Increased accommodation to provide for the expanding activities of the Department.

In the year's interval some progress has been made in respect of several of these matters. It is with satisfaction I report the appointment of Dr. E. Sydney Morris, Senior Medical Officer of Health for the State, as Director of Maternal and Baby Welfare, with control of the nursing staffs functioning at Baby Health Centres. Arrangements have been made also for the nursing staff which previously supervised these centres to be transferred to the offices of the Director-General of Public Health.

It is proposed that Dr. Morris shall, at an early date, visit and investigate the Child Welfare activities in some of the other Australian States and New Zealand, with the object of ascertaining whether or not any of the methods in operation there might usefully be adopted in this State.

Venereal Diseases.—On this important subject I regret to report that no effective action has been taken to provide additional clinic accommodation, either at Sydney or Newcastle, beyond one small clinic for syphilitic males at the Coast Hospital. I again stress the urgency of this subject. The proposal to provide an additional ward of fifty beds at the Coast Hospital for venereal patients requiring hospital treatment could not be carried out owing to want of funds.

Division of the State into Health Districts.—Funds have not been provided for these important appointments. As previously pointed out, such appointments would not only provide municipal and shire councils with expert medical advice on all matters pertaining to public health, but the educative propaganda in preventive medicine carried on by such officers would be potent factors in diminishing the economic loss caused by infantile mortality, infectious diseases, and other avoidable forms of illness.

Control of Tuberculosis in New South Wales.—A comprehensive scheme for dealing with tuberculosis, as outlined below, has been approved by Cabinet, and it is expected the scheme will be brought into operation at an early date. The following are some of the principal features of the scheme :—

(1) That the control of the campaign against tuberculosis be vested in a Board constituted as follows :—
  (*a*) Director-General of Public Health, Chairman (ex officio).
  (*b*) One representative of each institution (or group of institutions) dealing with tuberculosis.

(2) The Board to have, amongst others, the following powers and duties :—
  (*a*) Full control, through the special branch of the Public Health Department mentioned below, over all institutions in the matter of admission to and discharge from the latter.
  (*b*) Arranging with the appropriate organisations or otherwise for the adequate maintenance, &c., of the families of tubercular patients who are totally or partially incapable of supporting those dependent on them.
  (*c*) Carrying out propaganda in regard to the methods of combating the disease, &c.

(3) A special branch of the Department, in charge of a specially-qualified medical officer, to be formed to deal with—
  (*a*) The admission, transfer, &c., of all patients to institutions, with power to decide to which institution such patients shall be admitted.
  (*b*) Investigations into home and work-place conditions, &c.
  (*c*) "After-care" and "follow-up" of patients who are discharged from institutions.
  (*d*) Arranging for propaganda and education of public in avoidance of infection, &c.

(4) This special branch to be directly responsible to the Director-General of Public Health and, indirectly, through him to the Board.

Increased Accommodation necessitated by the Expanding Work of the Department.—It is hoped that provision will be made on the estimates for the current year of a sum adequate to provide for accommodation at least double to that available in the present building.

INFECTIOUS DISEASES.

Typhoid Fever.—The year was characterised by the very low incidence of typhoid fever. The notified cases numbered 533, a decrease of 235 cases compared with 1924, which was the lowest previous record, when 768 cases were notified. There were 80 deaths, yielding a case fatality of 15 per cent., compared with a case fatality of 12·5 in 1924.

Judged by the present death-rate, it would appear that the type of the disease is more severe than formerly. It may be that some cases of typhoid fever are not recognised, and so escape notification; or, on the other hand, it may be that in former years, when the recorded death-rate from the disease was much lower, the use of diagnostic tests was not then available to medical practitioners as it now is, and probably cases of illness resembling typhoid fever were notified as such, and their inclusion led to a lowering of the actual fatality rate from this disease.

The following figures show the progressive decrease in typhoid fever since notification was instituted in 1898 :—

Year.	Population.	Typhoid Fever Cases Notified.	Deaths.	Fatality Rate.
				per cent.
1898	1,313,130	3,302	387	11·7
1910	1,638,220	2,714	294	10·8
1920	2,099,763	1,016	132	13·0
1925	2,300,081	533	80	15·0

Decline in the prevalence of typhoid fever is usually regarded as a fairly reliable index of the general standard of sanitation in a community. The fact that with a constantly-increasing population there has been a progressive diminution in the annual number of cases of this disease may be taken as an indication that those insanitary conditions which favour its spread are being effectively eliminated.

Anti-typhoid Inoculation.—Generally speaking, protection against typhoid fever by means of anti-typhoid vaccine is not made use of to any great extent in a community in times of peace, whereas in war time it holds a leading place in the methods employed in preventing this disease. The general application of this method of prevention in a population subjected to gross insanitary conditions which foster the spread of the infection cannot be recommended. Such insanitary conditions should be remedied, and the necessary requirements of a healthy environment provided, such as safe water supplies, effective treatment of excreta, refuse and garbage, protection of foods, &c. At Broken Hill, where typhoid fever is endemic and its incidence always high, the environmental conditions largely favour the prevalence of this disease. Radical improvements are required in regard to most of these factors, but at the same time the difficulties in this connection are such as to warrant the belief that by the use of protective inoculation a substantial reduction in the incidence of typhoid fever could be brought about.

The risk to which nurses and others in attendance on cases of typhoid fever are exposed is exemplified at intervals in a striking manner. Several instances have occurred during the past year or so where nurses attending on typhoid fever cases in hospitals have contracted the disease. The authorities of the public hospitals in the State have been circularised, drawing their attention to the importance of having their nurses protected from these risks by means of preventive inoculation. It is encouraging to find that most of these authorities appreciate the advisability of insisting on this precautionary measure being carried into effect.

Scarlet fever continued prevalent, there being 3,043 notified cases, compared with 3,421 in 1924. There were 27 deaths (29 in 1924). An examination of the graph following page 40 shows that scarlet fever was epidemic in 1900, 1905, 1910 and 1915–16. In 1923–24 there was a slight increase in the number of notified cases. This disease still continues to be of a mild type as indicated by a fatality rate of less than 1 per cent. of the notified cases. Opportunity has not occurred so far to carry out the newer processes of sorting out susceptibles and inducing their immunisation, as is done in the case of diphtheria, but it is anticipated facilities will be made available for this in the near future. The use of antitoxin in the treatment of severe cases of scarlet fever has been tried in a few instances at the Coast Hospital.

Diphtheria.—Notifications of diphtheria were markedly lower—3,004 cases and 118 deaths, compared with 4,364 cases and 222 deaths in 1924. This is the lowest incidence of diphtheria recorded since 1919 (2,826 cases and 114 deaths). The fatality rate of the notified cases in 1921 was 3·9 per cent. The application of the Schick test for the detection of children susceptible to the disease and their subsequent immunisation has been carried out by medical officers of the Department in several country centres during the year. No inclination appears to be shown in the metropolitan area by local authorities in favour of the adoption of these procedures.

Infantile Paralysis.—There were 57 cases, with 14 deaths, compared with 108 cases and 6 deaths in 1924; 37 cases of *epidemic cerebro-spinal fever* were notified, of which 27 proved fatal.

Tuberculosis.—1,195 cases of tuberculosis of the respiratory system were reported from those parts of the State where notification is in force (Metropolitan and Hunter River Combined Sanitary Districts, Blue Mountains Shire, and the Municipalities of Katoomba and Blackheath). The Medical Officer of Health at Broken Hill recommends that tuberculosis should be made a notifiable disease in that district. On page 1 attention is drawn to a scheme for the control of tuberculosis which will probably be made to apply to all parts of the State.

Leprosy.—The 35th Report on Leprosy in New South Wales (page 143) shows that from 1890 to the end of 1925 a total of 170 persons affected with leprosy have come under the notice of this Department. Of this number 83 were whites of European descent. Among the coloured patients were 56 Chinese and 18 natives of the Pacific Islands. Chinese patients have always been repatriated as opportunity offered. At the end of 1925 there were 17 patients (13 males and 4 females) in the lazaret at Little Bay.

Cancer.—It will be seen from the Government Statistician's review on page 12 that there has been no improvement in the figures for this disease for 1925. In all there were 2,133 deaths, equal to a rate of ·94 per 1,000 living, and 7 per cent. above the average of the previous five years. Male deaths numbered 1,163, females 970, the rates being 1·00 and ·87 per 1,000 respectively. The Cancer Campaign inaugurated by the University of Sydney is being actively prosecuted with a view to acquirement of funds for intensive research, and the provision of facilities for the treatment of patients by radium and other modern methods.

VENEREAL DISEASES ACT, 1918 (Report, p. 47).

The Venereal Diseases Act which is in operation throughout the State provides for compulsory notification to the Commissioner of all cases attending at public clinics, hospitals, or under treatment by private medical practitioners.

Cases notified during 1925 numbered 5,314 (syphilis, 1,015; gonorrhœa, 3,933; other forms of venereal disease, 366), a decrease of 776 on the figures for 1924.

The notifications comprised 4,707 males (syphilis, 762; gonorrhœa, 3,584; other forms, 361), and 607 females (syphilis, 253; gonorrhœa, 349; other forms, 5); the proportion of male to female cases being 10 to 1 for syphilis, and 3 to 1 for gonorrhœa. These rates have remained practically without alteration for several years, and the marked disparity in the incidence of gonorrhœa in females corresponds with experience in other countries where notification is not in force.

Notification is anonymous, *i.e.*, by number only, but if a patient fails to continue under treatment until cured the medical attendant is required to report the name and address to the Commissioner. The patient is then informed of the penalties he is liable to unless he resumes treatment. In practically all cases where a patient can be reached resumption of treatment follows; in only a few instances has it been found necessary to resort to prosecution. The grave difficulty met with in this follow-up work is due to the large percentage of persons who give to their medical attendant a false name or wrong address. In 1925, 955 persons were notified for failure to continue treatment; of this number no less than 538 (or about 55 per cent.) could not be traced owing to a wrong address or false name having been furnished; 241 resumed treatment, and 176 cases were under investigation at 31st December.

An additional clinic for male syphilitics was opened at the Coast Hospital in June, but the available clinic accommodation in the Metropolitan district is still quite inadequate for the needs of a population of well over 1,000,000. Existing clinics require to be supplemented by establishment of a properly designed and fully staffed continuous clinic.

The important shipping and industrial centre of Newcastle is much worse off in this regard compared with the Metropolitan district. Consultations have taken place between this Department, the Newcastle Hospital Committee, and representatives of the Commonwealth Health Service in regard to establishment of a clinic at Newcastle, but up to the present this most pressing and urgent need has not been met, although the Minister has approved of sketch plans being prepared for a suitable building for clinic purposes.

The Royal Commission on Health, appointed by the Commonwealth Government in 1925, recommended in regard to venereal diseases a substantial increase of the Commonwealth subsidy to the States, the establishment of clinics for seamen at important seaports, more and better equipped clinics in the larger centres and more widely distributed in each centre.

Need for Ante-Natal Tests.—Efforts were made during the year to secure the co-operation of two large maternity hospitals in having tests made of the blood of expectant mothers attending the prematernity clinics. Only one of these institutions agreed and from it a series of 94 bloods were submitted between 3rd February and 11th March, of which 8 gave positive serological evidence of syphilitic infection. In addition to these 94 ante-natal tests, some 35 specimens from hospital patients were sent in between April and November. In several instances where the blood test was asked for as a result of syphilitic manifestations in the infant a positive diagnosis of syphilis in the mother was made post-natally. This is a serious matter as it concerns not only the mother, but the infant; a test of the mother's blood some months earlier would have detected the infection in time to institute ante-natal treatment, and the probable birth of a healthy infant. Prematernity tests are of the greatest importance, and should be included in the routine of ante-natal supervision.

Increased Use of Bacteriological Examinations.—The figures below indicate the increased use that is being made of laboratory tests in checking the results of treatment in venereal cases. Blood tests are carried out by the department free of charge for hospitals and clinics and for private practitioners where patients are not in a position to pay a private pathologist's fee.

Diagnostic examinations for Venereal Diseases made in the Microbiological Laboratory during the years 1923–1925.

Year.	Gonorrhœa. (Smears and Urine.)	Gonorrhœa. (Complement (Deviation Test).	Syphilis. (Wasserman Reaction.)	Syphilis. (Kahn's Test.)	Syphilis. (Smears for Spiro-chætes.)
1923	1,919	......	2,431	......	25
1924	2,261	1,265	3,674	......	10
1925	2,487	1,585	5,186	2,060	16

Educative Campaigns.—The Department issues a pamphlet and posters dealing with venereal diseases. It is recognised that more intensive propaganda is an urgent necessity for enlightening the public on the risks of infection, and where infection has occurred, of the need for obtaining prompt and thorough treatment. The English Royal Commission of 1916 recommended that "the general public should be enlightened on the perils of venereal disease and encouraged by every means possible to resort to treatment." Very valuable work in educating the public has since been accomplished by the British Social Hygiene Council and the Society for Prevention of Venereal Diseases. Included in the aims and objects of these bodies are the prevention and treatment of venereal diseases by appropriate administrative, medical and social measures; removal of conditions conducing to promiscuity, and furtherance of social customs which promote a high and equal standard of sex conduct in men and women. It is to be regretted that no voluntary organisation is actively engaged in this State in similar work, as it could undoubtedly achieve a vast amount of good by spreading a knowledge of the perils and dangers of venereal disease; in securing better provision for treatment, and by co-operating with the Department in the organisation of lantern and other lectures; instruction in sex hygiene, and similar preventive work. Steps are being taken to obtain cinematograph films dealing with venereal disease.

MICROBIOLOGICAL LABORATORY.—SIXTEENTH ANNUAL REPORT (p. 164).

The Principal Microbiologist in presenting the sixteenth Annual Report of the Laboratory under his charge directs attention to the steady increase in the work of this important branch of the Department's activities, as indicated by the following figures :—

ANNUAL Return of Routine Specimens Examined in the Microbiological Laboratory during the years 1916 to 1925 :—

1916	10,322	1921	17,006
1917	11,001	1922	19,188
1918	10,810	1923	18,675
1919	9,207	1924	23,990
1920	12,663	1925	25,344

During the past two years the increase has been largely in serological examinations for venereal diseases. In 1925 the Wassermann reaction was carried out on 5,186 sera as against 3,684 in 1924. In addition the Kahn flocculation test was much more frequently used and it was found to be of value both as a check on the Wassermann reaction and in detecting evidences of infection not revealed by this reaction; the test was particularly valuable in ascertaining the progress towards cure in cases under treatment.

Gonorrhœa.—The figures both for the examination of smears for gonococci and for the complement deviation test show slight increases.

Other notable increases are in the number of tissues examined for detection of malignant disease (cancer); of 1,141 tissues sectioned 356 (31·2 per cent.) were found to be malignant. Reports received from medical practitioners bear testimony to the favourable results achieved by the autogenous vaccines prepared in the laboratory for use in cases of bacterial infections.

There was a marked decrease in the number of swabbings examined for diphtheria due to this disease being less prevalent than for several preceding years. The number of notifications received (3,004) is the lowest recorded since 1919 (2,826). Schick tests were continued, the number of children tested being approximately equal to the number in 1924. The results of the campaign carried out in 1925 at Coonamble, Gulargambone, Quambone, Narrabri, Cowra, and Corowa, are shown in a special report (p. 179). The Schick campaign could be extended but for the inability of the present staff to cope with the additional work. An important aspect in connection with the incidence of diphtheria is that 53 per cent. of the diphtheria notifications are from the metropolitan area where there are approximately 200,000 children of school age. Up to the present date only 209 of this total have been submitted to the Schick test. This branch of work could be greatly expanded, especially if it could be organised in conjunction with the school medical service. It might then also be possible to undertake immunisation against Scarlet Fever by application of the Dick test which is very similar to the Schick test in the case of diphtheria.

Typhoid Fever.—An investigation was made by the Principal Microbiologist into the occurrence of typhoid fever at Broken Hill, and a report on the subject is included in the infectious disease section (p. 41).

Anthrax.—Shaving brushes infected with anthrax are still on the market is proved by the fact that three cases of this disease due to the use of infected shaving brushes occurred in 1925. Dr. Ferguson gives a detailed report of the cases and also reviews the reported Australian cases from 1917 to date. Photographs of known infected and suspected types of shaving brushes are included in the report. The infected brushes which were responsible for the three cases of anthrax in 1925 formed part of stocks which were found to have been in circulation in the State for a considerable period.

Plague.—The routine examination of rats for the presence of plague was continued; 12,850 were examined but no infected specimen was found. To ascertain whether the sex incidence varied to any extent in different seasons the returns of rats and mice brought in daily for examination were tabulated in months over a period of five years, 1915 to 1919 inclusive. The series comprised 36,789 animals (*R. norvegicus* 12,875; *R. rattus* 23,435; *M. musculus* 479). The percentages were found to be remarkably constant throughout, the one exception being of *musculus* in 1915.

Food Poisoning Outbreaks in New South Wales.—On p. 181 a report is presented by the Principal Microbiologist on a series of ten outbreaks of food poisoning which occurred between 1922 and February 1926.

Cases of food poisoning of one form or another are met with each year usually during the summer and autumn months. The number of such cases during recent years appears to be on the increase. This may be explained by the greater publicity given to these matters nowadays. It is probable that the less severe outbreaks of this form of illness sometimes escape entirely the notice of this Department. Not unusually the first information is derived from press reports, and though these probably represent isolated instances of food poisoning, they are of special interest and importance, seeing that a considerable number of persons is sometimes involved; the type of illness is more severe necessitating recourse to hospitals for treatment by a number of the sufferers. The compulsory notification of cases of food poisoning has been urged by sanitary authorities in some parts of the world, but though this procedure has not been adopted, except in isolated instances, the importance of the subject warrants closer attention than is often given to it.

Cases of food poisoning are met with both in the towns and in country places. The rapid increase in population in the cities, with its accompanying overcrowding of houses, many of which do not possess proper means for the safe storage of perishable foodstuffs, tends to favour their contamination with consequent risk to the consumers. Life in large cities has another effect in tending to increase the extent to which people resort to canned foods and meats sold in cooked condition. The increased use of this form of food emphasises the necessity for greater attention being paid by sanitary authorities to premises used for this class of business. The question of ensuring the proper sanitary condition of premises used for the manufacture, preparation, storage or sale of foods for human consumption is of very great importance, and, in order to improve matters, it has been urged by some local authorities that all such premises should be subject to license. The Local Government Act empowers councils to control and regulate premises of this description, but so far no ordinances have been framed under that Act to deal with them. The regulations under the Pure Food Act are very wide in scope and contain powers which, if efficiently carried out, will go a long way towards ensuring a wholesome food supply. Medical examination of persons handling foodstuffs is a matter of routine in several of the American States.

Food poisoning is in most cases due to infection with bacteria, excluding cases where food may contain metallic or other poisons. Such bacteria include the bacteria of dysentery, typhoid, botulism, and the food poisoning bacilli. The series of outbreaks dealt with by Dr. Ferguson comprise those due to infection with bacilli of the food poisoning or Salmonella group. Food poisoning due to bacilli of this group is commonly termed "Ptomaine poisoning." The term is, however, quite an erroneous one, and should be discarded. Food is not allowed to decompose before consumption to the extent that ptomaines are formed. The only exceptions are game and venison, and these are not especially prone to cause food poisoning. On the other hand, food poisoning may be conveyed by food which to all appearances is fresh and undecomposed. A leaflet giving useful advice in connection with food poisoning is issued by the Department.

Mosquito Surveys in New South Wales (p. 188).—Whenever opportunity is afforded of visiting inland towns in connection with the investigation of disease or in carrying out other Departmental duties efforts are made to ascertain the mosquito fauna in the neighbourhood. During 1925 mosquito surveys were carried out at Narrandera, Inverell, Moree, and Bourke.

Investigations into Onchocerciasis (Worm Nodules in Cattle) in New South Wales (p. 193).—Under the above heading are brought together two important contributions to the experimental work in this State concerning the transmission of worm nests in cattle. The papers presented by Dr. Ferguson comprise :—1. A summary of the experimental work carried out by a special committee appointed by the Commonwealth Advisory Council of Science and Industry. 2. Final report of the special committee. 3. Surveys of cattle in various districts in New South Wales from 1917 to 1920 for detection of worm nodules.

INDUSTRIAL HYGIENE (Report, p. 52).

The section of industrial hygiene, under the charge of Dr. Charles Badham, has, during the year, investigated various important problems in connection with the ever-increasing industrialism of the State.

Sugar Dust Explosion.—A serious explosion of sugar dust in the storage bins of the Colonial Sugar Refining Company at Pyrmont, which caused the death of three men, was studied, and shown to have resulted from the breaking of an electric light globe in a cloud of combustible dust. It is considered that the grave danger inherent in carbonaceous dusts in suspension is not fully recognised, and though serious disasters have not hitherto been reported to have occurred in our factories, or other work places where such dust-laden air occurs, this good fortune cannot be expected to continue in the absence of a more general recognition of the potential dangers of such dust clouds.

Sandstone Dust.—The methods which this branch has worked out for the sampling of air in workplaces where sandstone occurs—for example, in sewer and railway tunnels—have been adopted by various public bodies carrying out undertakings where this form of rock occurs, with the result that the industrial conditions of the workmen have been considerably improved, and it can reasonably be expected that the incidence of silicosis, resulting from this industrial hazard will be diminished as the outcome of these improvements.

Lead Poisoning.—Considerable attention has been paid to the subject of lead poisoning in industry. A new industry to this State, that of motor-car battery making, has largely increased the numbers of men suffering from this most common of industrial poisoning. As a result of an intensive study of a considerable number of men afflicted by plumbism, it has been possible to set out the most important signs and symptoms which are of value in the diagnosis of this condition.

Ventilation of Public Halls and Workrooms.—The staff of this branch is engaged in an extensive research with the object of formulating standards for ventilation of theatres, public halls, and factories, which, when applied, should result in more hygienic conditions in these places.

FOOD INSPECTION (p. 18).

The volume of work of the Pure Food Branch was well maintained.

Meat.—The extent to which dusting powders containing preservatives were being used on fresh meat was made the subject of inquiry during the year. Of the 436 samples analysed 79 (18 per cent.) were found to have had the surface "dusted" with a sulphite preservative powder. Warnings were issued to traders that the regulations prohibiting the use of such powders would be strictly enforced.

Sulphur Dioxide in Sausages.—Seventy-one prosecutions were instituted for an excess of sulphur dioxide in sausages, and fines and costs amounting to £208 were recovered.

Bread Supply.—Inspections were made in connection with the preparation and delivery of bread and pastry, and several bakeries were remodelled and refitted under the supervision of departmental officers.

Ice Cream.—Officers were detailed to make investigation into the manufacture and sale of ice cream. one hundred and one samples were submitted to analysis, and eight successful prosecutions were undertaken for adulteration.

Fresh Cream.—Forty-four samples were analysed and four were found to be adulterated, formalin or calcium sucrate being used as a preservative.

Inspections were made of 12,196 premises used in connection with the storage, sale, or preparation of food. One hundred and six persons were prosecuted for unclean premises or other breaches of the Act, the fines imposed amounting to £573. In the course of such inspections over 60 tons and 200,000 packages of assorted foods in a damaged and deteriorated condition were seized and destroyed.

METROPOLITAN MILK SUPPLY.

In my report for 1924 attention was directed to the small per capita consumption of milk—about one-third of a pint per day—in Sydney; and to the relatively high price of this important food. Reiterated references to the need for increasing the supply at a reduced cost to the consumer has at length aroused public interest, and during the current year there have been several important conferences dealing with different aspects of the milk question. A comprehensive report on the subject is in preparation, and will be included in my annual review for 1926.

ANALYTICAL LABORATORY.

The Government Analyst's report (p. 14) comments on the notable reduction in adulteration of country milk samples. A total of 15,060 samples of milk was examined for comparison with the standard formulated under the Pure Foods Act. Of this number, 12,195 samples were collected in the metropolitan area, the proportion of adulterations being 3·1 per cent. of the total examined. 2,865 samples were collected in country districts; of these 113 (3·9 per cent.) did not conform to the standard. This percentage of adulterations is the lowest yet recorded for country milks, and maintains the improvement shown in 1924.

Infants' Foods.—As the standard for these foods was not considered satisfactory, an investigation was made with a view to preparing an amended draft standard for submission to the Pure Food Advisory Committee. The present standard does not permit of the presence of wood fibre. On analysis it was found that all the infants' foods submitted for examination contained a proportion of wood fibre, with the exception of the foods prepared solely from dried milk.

Disinfectants.—All disinfectants required in the public services for hospitals and for use in the disinfection of public buildings, such as theatres, picture shows, &c., are submitted for the determination of their strength and suitability for the purpose.

Rag, Flock, and Feathers.—Samples of these materials were examimed with a view to setting up standards of cleanliness before permitting use of such materials in the manufacture of mattresses, pillows, &c. Further investigations are in progress.

WATER CATCHMENT AREA COMMITTEE.

The draft of a comprehensive code of by-laws for protection of the metropolitan catchment areas was finalised by the committee at the end of 1925, and presented to the Minister.

Bacteriological examinations made in the microbiological laboratory during 1925 comprised a fairly extensive series of water samples from country town supplies, which were forwarded by the Public Works Department for examination. These examinations are being continued, and the results will be reviewed in a later report.

METROPOLITAN COMBINED SANITARY DISTRICT.—REPORT OF MEDICAL OFFICER OF HEALTH

(DR. J. S. PURDY) (p. 98).

Dr. Purdy reports that on the 31st December, 1925, the population of the Metropolitan Combined Sanitary District was 1,184,480, an increase during the year of 33,610, equivalent to 2·92 per cent.; the death-rate was 9·3 per 1,000; and the infantile mortality 55·6 per 1,000 births.

Causes of Death.—An analysis of the chief causes of death shows that the group, *Diseases of the Heart* (1,472) again occupies the premier position, with a rate of 143 per 100,000. *Cancer,* with a toll of 1,155, was the next chief cause of death, the rate being 112 per 100,000 population, or 12 per cent. of the total deaths. Leaflets and posters were freely distributed by this office and the City Council pointing out the urgency of obtaining expert advice in every case of suspicion.

Pneumonia, one of the most wide-spread and fatal of all acute diseases, caused 724 deaths. *Bright's Disease* (acute and chronic) claimed 572 victims, and *Acute Nephritis,* 541. Deaths from *Cerebral hæmorrhage* numbered 424 (males 211, and females 213). *Pulmonary tuberculosis* (with 398 deaths) dropped to the seventh place in the list, and showed a decrease of 87 on the average of the previous five years.

Infantile Mortality in the Metropolis.—Deaths of infants under 1 year of age numbered 1,255, and the births 22,036, giving an infantile mortality rate of 55·6 per 1,000 births. This rate is 10 per cent. below the average of the previous five years. A gratifying feature in the vital statistics of the metropolis is the decrease in the number of deaths from diarrhœa and enteritis; in 1925 there were 303 deaths from these diseases, in contrast to a yearly average of 596 for the previous five years.

Maternal Mortality.—In the metropolis there were thirty-five deaths in childbirth from puerperal septicæmia, of which twenty-three were of mothers under 30 years of age; this is a reduction of 24 per cent. below the average of the preceding five years. Unfortunately, there were 122 deaths from other puerperal diseases, an increase of eighteen on the number in 1924, and a rise of 12 per cent. on the average of the previous five years; the occurrence of thirty-four deaths from puerperal albuminaria and convulsions constitutes a strong appeal for prematernity supervision.

Epidemic Diseases.—Typhoid fever, diphtheria, measles, influenza, infantile paralysis, and epidemic cerebro-spinal meningitis all showed decreases on the average death-rate for the previous five years. Whooping-cough, with 124 deaths, showed an increase of 48 per cent. on the average of eighty-four deaths for the previous five years. 93 per cent. of the deaths were of children under five years of age.

Typhoid Fever.—187 cases of typhoid were notified in the metropolitan area, an attack rate of ·18 per 1,000 of population. There were thirty-three deaths, a high case mortality of 16 per cent., which suggests to Dr. Purdy that a number of cases are either not notified or not diagnosed as typhoid. With modern treatment the case fatality should not exceed 10 or 12 per cent., unless the disease is of a more virulent type. Extension of the sewerage should be speeded up, as large suburbs are still served only by a dry-earth system; in the Canterbury municipality alone there is a weekly service of 13,000 pans.

Diphtheria.—Notifications in the metropolitan district numbered 1,608, with sixty-one deaths. Dr. Purdy points out that the best way to lessen the incidence of diphtheria would be to protect the whole child population with toxin antitoxin without a preliminary Schick test. Where the child gave a negative test no harm would be done, whereas the procedure would be simplified if universally applied, with, of course, the parent's consent. Practically no immunization against diphtheria has been done in the metropolitan district, although more than 53 per cent. of the cases in 1925 occurred in this area.

Infantile Paralysis.—Forty-one cases were notified in the metropolitan district, of which one proved fatal. Half the cases occurred in December, contrary to the experience of previous years, when the months of highest incidence were April and May. In New Zealand, where there was an outbreak of over a thousand cases, the epidemic began in the latter part of November, 1924, and reached its maximum towards the end of February, 1925.

Parks, Reserves, and Playgrounds.—Dr. Purdy points out that exercise and play are almost as essential for a child's development as air, food and sleep; it is not only for the younger children that playgrounds are necessary. The increasing amount of industry carried on within doors, where the work for the most part does not call for the exercise of the major muscles of the body, make it increasingly necessary to provide facilities for outdoor recreation and playing areas are necessary for girls and young women, as well as more playing fields for the national games of cricket and football, as well as golf. Steady propaganda is carried on by the Town-planning authorities, who lay down the principle that at least a tenth of the area of a municipality should be reserved for parks and recreation grounds; and that in planning, the ultimate increase of population should be considered, for the reason that as soon as any area is built over it becomes too costly to clear and reconvert to recreation purposes. The City Council is providing a playing area in each of its thirteen wards; and the Government has set aside as public reserves Berry Island and Ball's Head at North Sydney; Dobroyd Point at Manly; 44 acres at Lidcombe, and Brown's Forest at Pymble.

HUNTER RIVER COMBINED SANITARY DISTRICT.

Recent years has shown a rapid expansion of industrial undertakings in the important mining and shipping centre of Newcastle, and the increase in population accompanying it has brought to urgent notice the shortage of housing and hospital accommodation.

A careful review of the health conditions of the district are contained in the report of the Medical Officer of Health (p. 114). Attention is again directed to two extremely urgent requirements, namely, the need for erection of an infectious diseases hospital, and of a free clinic for treatment of venereal diseases. Dr. Wallace regards this latter requirement as the most urgent health need of the district; he points out that facilities for laboratory diagnosis of suspected cases are inadequate that accommodation is so limited that adequate treatment cannot be provided, and says " that treatment given is palliative rather than curative . . . in many instances the suspected case can only be given a bottle of medicine and advice for self treatment which is generally worse than useless " The actual numbers of cases in the district are difficult to determine, but being a large seaport there is no doubt that a great deal of venereal disease exists; applications for treatment at the Newcastle Hospital alone are estimated at 400–500 a year.

BROKEN HILL AND DISTRICT.—REPORT OF MEDICAL OFFICER OF HEALTH (p. 121).

The first whole time Medical Officer of Health (Dr. R. S. Trotter) took up his residence at Broken Hill in September, 1925, but resigned at the end of the year owing to health reasons. The report on p. 121 discloses the very careful survey of the district made by Dr. Trotter during his three and a half months stay, and the loss of his services is greatly regretted.

Shortage of Maternity Accommodation.—Attention is directed to the urgent need for additional maternity beds both for residents of Broken Hill and the surrounding districts. Maternity wards are required at the public hospital, and in nursing homes elsewhere.

District Home for the Aged and Infirm.—Another urgent requirement is provision of a district home. At present accommodation for such cases has to be provided at a distance necessitating long and fatiguing train journeys and separation from relatives and friends.

Tuberculosis.—Dr. Trotter recommended that tuberculosis be proclaimed as a notifiable disease at Broken Hill in the interests of the public.

Health Week.—A very successful health week was held in the first week in November, much enthusiasm and interest being displayed.

TYPHOID FEVER AT BROKEN HILL (p. 41).

In 1925, 80 cases of typhoid, with 10 deaths, were reported, equivalent to a rate of 303·74 per 100,000 of population, compared with a rate of 23·11 for the whole State. In " Notes on Typhoid Fever at Broken Hill " (p. 41), Dr. E. W. Ferguson, who made an investigation in June, 1925, remarks : " The probable source of the greater part of typhoid fever in Broken Hill is to be looked for in the general state of sanitation of the whole town. The seasonal incidence of typhoid corresponds very well with the season of greatest fly prevalence. . . . The distribution of the cases could also be accounted for by spread of infection through the medium of flies."

Infant Mortality, Broken Hill (p. 124).

The problem of infant mortality at Broken Hill was investigated as carefully as time would permit by Dr. E. Sydney Morris, Director of Maternal and Baby Welfare, during a recent visit to that city. Dr. Morris recommended:—

1. That a departmental sanitary inspector should be immediately sent to Broken Hill, where he should remain for several months. Every effort to bring about an improvement of sanitation should be made by him, as far as possible in co-operation with the Local Authority, but, if necessary, independently of it.
2. That in conjunction with the departmental sanitary inspector special nurses should be detailed to assist in combating gastro-intestinal infections during the late summer and autumn.
3. That laboratory facilities should be provided along the lines indicated in a special report to carry out, *inter alia*, investigations concerning gastro-intestinal infections.

Dr. Morris summarised the position in regard to infant mortality in the district as follows:—

(*a*) Broken Hill and the Western Division of New South Wales has an excessive infant mortality which constitutes a problem of the greatest magnitude.
(*b*) This mortality must be reduced if New South Wales is to compare favourably with other States and countries.
(*c*) The chief cause of this excessive mortality is probably bacillary dysentery.
(*d*) Baby Health Centres alone cannot solve the problem. Improvement of the general sanitation is an urgent necessity and of vital importance.
(*e*) Seventy per cent. of total annual babies in Broken Hill come under the influence of the Baby Health Centres, but *seventy-five of the total mortality occurs among those babies* (30 *per cent.*) *who do not attend the Baby Health Centres.*
(*f*) Ignorance and indifference on the part of mothers may not necessarily be followed by fatal results, but, owing to the peculiar local conditions they tend to exact a certain and very heavy toll of infant life in Broken Hill.
(*g*) Prenatal causes of infant mortality are no greater, perhaps not so great, than in the State as a whole.
(*h*) Intensive efforts during the late summer and autumn, especially in co-operation with the local hospital, give prospects of improving the situation.
(*i*) Co-operation between the Baby Health Centres, doctors and midwives is satisfactory.
(*j*) Educational propaganda and publicity is extremely necessary.

Public Hospitals.

As indicated in my Report for 1924, the Public Hospitals Act of 1898 does not meet present-day needs, particularly in regard to the financial requirements of hospitals. Enquiries have been made into the hospital systems in operation in other Australian States and in New Zealand. During the year advantage was taken of the visit to this State of Dr. M. MacEachern, who has a wide experience and knowledge of the hospital systems in Canada and America. He was asked by the Minister to report on the present hospital system in this State, and to indicate in what directions it might be improved. A Hospital Bill is now in course of preparation for submission to Parliament.

Private Hospitals Act, 1908 (Report, p. 26).

Twelve additional hospitals were licensed in 1925, making a total of 620 on the register (metropolitan area, 252; country, 368) with a bed capacity of 4,940 of which about one-third are solely for maternity cases. Slightly more than one half of the hospitals (327) contain from 1 to 5 beds; 253, from 6 to 20 beds; the bulk of these being in country districts (country, 156; metropolitan area, 97). The larger private hospitals, those containing more than 20 beds, are practically all in Sydney, the returns showing 32 in the metropolitan area, and only 8 in the country.

Effect of Nurses Registration Act, 1924, *on the Private Hospitals Act.*—The Nurses Registration Act which comes into operation on 1st January, 1926, defines "hospitals" and "midwifery" and repeals the clauses in the Private Hospitals Act relating to the registration of nurses. Dr. Suckling directs attention to the possibility of uncertificated women who have been engaged in nursing for a number of years securing registration under the concession clauses of the Nurses Registration Act and thus being eligible for license as resident managers of private hospitals. Hitherto it has been the policy of the Board of Health not to issue licenses to uncertificated nurses except in very exceptional circumstances. On the other hand the requirements of the Nurses Registration Act in regard to the standards of equipment and technique in private hospitals should be of value as such standards were not hitherto enforceable under the Private Hospitals Act. In regard to administration, supervision of registered nurses can be readily co-ordinated with frequent systematic inspection of private hospitals.

Coast Hospital (Report, p. 128).

The Medical Superintendent (Dr. R. J. Millard) reports that 8,935 in-patients were treated at the Coast Hospital in 1925; the average daily number of occupied beds was 578·06; and the average annual cost of maintenance per head was £143 9s. 2d.

Diabetic Ward.—The ward opened in 1924 proved to be very useful. One hundred and sixteen patients suffering from diabetes were treated in 1925; of these patients 37 were males and 79 females. Insulin was largely used and with great benefit. The patients were encouraged to take an intelligent interest in the matter of diet and treatment, and their stay in hospital thus had great educational value, and usually enabled the patient to return to fairly normal life and occupation. A number of the patients after discharge periodically attend the hospital for examination and advice. Insulin to the value of £184 was used during 1925 and this may be regarded as money very well spent.

Abortion.—During the year 497 patients were treated for abortion. The admissions for this condition have increased of late years at a startling rate, as indicated by the following figures, which show the ratio of abortion cases to all cases treated in successive years 1919–1925 inclusive:—

Year.	Total patients treated.	Abortions.	Percentage.	Year.	Total patients treated.	Abortions.	Percentage.
1919	5,941	54	0·91	1923	8,769	381	4·34
1920	6,313	193	3·06	1924	8,667	436	5·03
1921	6,952	237	3·41	1925	8,935	497	5·56
1922	7,339	354	4·82				

Of these patients Dr. Mfllard says: "I think it may be taken for granted that in the great majority of these cases, if not in all, the abortion had been artifically produced. The patients were sent to hospital on account of a rise of temperature which raised alarm of sepsis. Of the 497 under treatment in 1925, seven died from this cause; the others recovered. The situation has thus been created that the hospital acts as an accessory or cover to the abortionist by admitting and curing any of his victims who show signs of going wrong after the operation. This is certainly an improper role to be forced on a Government institution, but so far no remedy has been found. Meanwhile the practice of abortion must be increasing enormously in the metropolis, as the patients who seek admission to hospital are probably only a small proportion of those on whom the criminal operation is performed."

The continuously increasing practice of abortion, as disclosed in Dr. Millard's report, must exercise serious evil effects as regards the birth rate, the infantile mortality, and maternal death rates of the community.

STATE HOSPITALS AND ASYLUMS, MATERNITY HOSPITALS, &c., AND CONVALESCENT HOMES.

Work at the various State Hospitals, State Hospitals and Asylums, and Maternity and Babies Hospitals and Convalescent Homes has progressed smoothly and efficiently throughout the year.

Need for Additional Accommodation.—In connection with several of the departmental institutions, *e.g.*, Rookwood and Liverpool State Hospitals and Asylums, I desire to draw attention to the urgent need which exists for increasing the accommodation for patients at these institutions. Apart from the two new pavilions recently opened at Liverpool, and which were immediately fully occupied, there has been no additional accommodation provided for many years, with the result that the institutions are in a continual state of acute overcrowding. This is an urgent matter which presses for attention.

Waterfall Sanatorium.—The Medical Superintendent (Dr. H. W. Palmer) reports that during 1925 983 patients (653 males and 330 females) were under treatment in the Waterfall Sanatorium. Of the 388 patients discharged during the year 47 were classed as having the disease arrested; 115 as much improved and able to resume light work; 195 as improved; and 31 were unimproved and gained little benefit from their stay at Waterfall. During the year there were 158 deaths (101 males and 57 females).

Treatment was along ordinary sanitorium lines, though tuberculin and antigen, as well as sodium morrhuate, were used in a few cases. Volatile oils were tried by continuous inhalation, but apart from giving a certain amount of relief, especially in throat cases, no effective curative results were noticed.

To provide outdoor work at Waterfall for sufficiently recovered patients areas of cultivated land in the gardens were allocated to their use. The patients work under the direction of the sanatorium foreman and the institution pays market rates for all vegetables produced.

Honorary Medical Staffs.—Grateful thanks are tendered to the honorary medical staffs attached to these various institutions for the very valuable and untiring services rendered by them to the sick and needy.

POLLUTION OF THE HARBOUR AND ITS FORESHORES.

The foreshores of Sydney Harbour (Port Jackson) are some 200 miles in length, and in recent years there have been frequent complaints of nuisances arising in different localities. There are several factors which make for insanitary conditions, particularly in those parts of the watershed and tributaries of Port Jackson where settlement and industrial development are proceeding very rapidly. The subject is one of considerable magnitude, owing to the extent of the water area (14,284 acres) and the numerous bays and inlets, and is likely to become more complicated with every year of Sydney's development. It was, therefore considered desirable to take definite action to investigate the causes leading to this pollution and to formulate schemes to satisfactorily deal with the problems. As a result of representations to the Minister an inter-departmental committee was appointed composed of representatives of the Harbour Trust, Water Supply and Sewerage Board and Departments of Public Works and Public Health. The committee first met in September, 1925. So many complaints had been received concerning the upper portion of Parramatta River, where a number of large industrial works have been established, that the committee decided to make this area the subject of its first report. However, as some improvements have recently been constructed in this area, it was decided to ascertain their effect before submitting a report.

Attention was, therefore, concentrated on Haslem's Creek, which discharges into the Parramatta River at Wentworth Bay. The portion of the Creek investigated extends from a point on the south side of the main western road down stream to Wentworth Bay, a length of about 2 miles. This section of the creek is subject to tidal action. It follows a very tortuous course through a wide mud flat and mangroves grow densely on the banks. At high tide the average width of the water surface in the upper half of the creek is about 50 feet, and at low tide about 10 feet, when there is only a foot or two of water in the creek bed. Except after heavy rain the water in the creek is always foul, and gives off very offensive odours. The water in Wentworth Bay, into which the creek empties, is on the whole in little better condition than the creek itself, the bed of which is composed of black-looking ooze, from which offensive gases escape more or less constantly.

The principal forms of pollution which reach this creek are certain wastes from the abattoirs, sullage waters from neighbouring municipalities, and, until recently, the discharge from a hide-curing establishment.

The committee was of opinion that these various forms of pollution should be prevented from reaching the creek unless effectively purified, and recommended certain measures to attain this end. It further recommended that a canal should be constructed from Wentworth Bay to Parramatta-road, and that from this point in a southerly direction a concrete channel should be constructed as far as the existing dam.

OIL POLLUTION OF THE HARBOUR.

Complaints are received from time to time of pollution of the Harbour by oil wastes. This matter is, however, receiving the attention of the Harbour Trust.

NUISANCE FROM SEWER GAS EMANATIONS, WESTERN SUBURBS.

The Technical Sub-committee appointed in 1924 presented an interim report containing a summary of the investigations made and conclusions reached to 31st December, 1925.

It was found that about 470,000 gallons of wastes were discharged from the Homebush Abattoir into the low level sewer daily, the bulk of this—about 300,000 gallons—being washing-down water from the slaughtering floors, and the balance—170,000 gallons—from other departments.

Investigations made with experimental plants showed that the bulk of the suspended solids could be recovered from the 300,000 gallons of slaughterhouse wastes, and the effluent purified sufficiently to allow of its discharge into the Parramatta River without risk of pollution. At the time of presenting the interim report experiments were in progress with a view to devising a satisfactory method for dealing with the 50,000 of highly putrescible sewage from the gut-scraping department.

Considerable progress has been made in dealing effectively with a number of the wastes. The Meat Industry Board has expended about £30,000 in installing treatment plants, as a result of which some 22 tons of solids, which hitherto were discharged into the sewer each week, have been prevented from so doing and are now converted into commercial products.

A treatment plant for the 300,000 gallons of daily effluent from the slaughtering floors is estimated to cost £40,000. As this effluent would yield only a very small return of saleable material, the Meat Industry Board has not felt justified so far in incurring this large expenditure. It is thought that by a re-organisation of methods in cleansing this section of the Abattoirs, a substantial reduction in the volume of this waste can be effected, and at the same time a considerable amount of the putrescible solids now entering it could be excluded. Under these circumstances, the Committee decided to allow the treatment of the waste to remain in abeyance until the Meat Board had finalised its part of the investigation.

VENTILATION OF TELEPHONE CABINETS.

In consequence of complaints received from members of the public a number of the cabinet type of telephone bureau used in the city and adjacent suburbs were inspected by officers of this department. A report was submitted to the Postmaster-General setting out the alterations deemed necessary to provide for adequate ventilation of the cabinets. After an inspection in conjunction with an officer of the Postal department several of the cabinets were fitted up on the lines recommended, and arrangements were made at the same time for regular cleaning of the cabinets.

HEALTH WEEK.

The "Health Week" movement has apparently become firmly established. In the metropolitan district the first week in October is annually celebrated as "Health Week" and yearly attracts greater attention. Appropriate posters are exhibited throughout the city; leaflets containing useful advice on health matters are freely distributed; business firms in central positions place display windows at the committee's disposal for exhibits emphasising one or other aspect of health work; and lectures, lunch hour talks, and school addresses are broadcasted daily. "Weeks" were carried out in several large country towns, including Broken Hill, Wagga, and Newcastle. Personal practice of the principles and rules of hygiene and cleanliness is the first and most important step towards betterment of the "public health," and the "Health Week" campaign exercises an important educative influence, as it is an appeal to the individual to realise his personal responsibility for cleanliness in the home, his working place, and general surroundings.

HEALTH PROPAGANDA.

In furtherance of its publicity work numerous lectures and addresses were given by medical officers of the department on public health subjects, including the milk supply, pure food, prevention of venereal diseases, disinfection, diphtheria prevention, mosquito and fly control, &c., &c., and departmental posters, pamphlets, and leaflets on the above subjects, and on cancer, consumption, infantile paralysis, dengue, and the more common infectious diseases have been widely distributed.

VITAL STATISTICS.

Appended is a copy (p. 11) of the Government Statistician's review of the Vital Statistics of the State for 1925. An analysis of the figures for the thickly populated centres of Sydney and Newcastle is contained in the reports of the Medical Officers of Health for those districts (pp. 98 and 114).

On p. 124 is a report by the Director of Maternal and Baby Welfare on the high infant mortality rate for Broken Hill and the Western Division of the State, and recommending measures for its improvement.

Infectious Diseases.—Detail figures and graphs relating to the notifiable infectious diseases are contained in section 1B, p. 32.

T. H. NEELY,
Secretary.

ROBERT DICK,
Director-General of Public Health.

EXTRACT FROM THE REPORT OF THE ACTING GOVERNMENT STATISTICIAN, MR. T. WAITES, ON THE VITAL STATISTICS OF NEW SOUTH WALES FOR 1925.

Population.—The population at the end of 1925 was 2,300,081, of whom 1,172,470 were males and 1,127,611 females, the proportion being 104 males to 100 females. During the year the population increased by 43,991, or 1·95 per cent., of which 33,792 was due to the excess of births over deaths, and 10,199 to the excess of arrivals over departures. The mean population was 2,275,886.

Marriages.—The number of marriages was 18,522, corresponding to a rate of 8·14 per 1,000 of the population. The rate is 4·8 per cent. below the average of the previous five years. In the Metropolis the rate was 9·65, and in the remainder of the State 6·90, per 1,000 of population.

The proportion of males married who were under 21 years of age was 6·97 per cent., and of females 25·08 per cent. The proportion in both cases is above the average for the previous five years.

Of the marriages 17,393 were celebrated by the clergy and 1,129 by registrars. The largest number, 7,850, were celebrated according to the forms of the Church of England; then followed the Roman Catholic Church with 3,784, the Presbyterian with 2,522, the Methodist with 2,179, and all others 1,058.

Births.—The total number of births was 54,615, equivalent to 24·00 per 1,000 of population, which is 5·0 per cent. below the average of the previous five years. Of this number 27,878 were males and 26,737 females, the proportion being 104 males to 100 females.

Dividing the State into the Metropolis and remainder of the State, there were 22,036 births in the former and 32,579 in the latter, corresponding to rates of 21·51 and 26·03 respectively. In the Metropolis the rate is 8·8 per cent., and in the remainder of the State 2·0 per cent., below the average of the previous five years.

The number of illegitimate births was 2,756, equal to 5·0 per cent. of births, which is slightly above the quinquennial average. In the Metropolis the proportion was 6·9, and in the remainder of the State 3·8 per cent. of births. The relatively high proportion in the Metropolis is influenced greatly by the presence of seven public maternity institutions, and numerous private lying-in homes. Proportionately to population, illegitimate births represented 1·21 per 1,000, which is 2·4 per cent. below the average of the last five years.

Deaths.—The deaths during the year numbered 20,823, equivalent to a rate of 9·15 per 1,000 of the population. This rate is 3·6 per cent. below the average of the previous five years.

The total includes 11,944 males and 8,879 females, equivalent to rates of 10·29 and 7·96 respectively per 1,000. The rate in the Metropolis was 9·32 per 1,000, and in the remainder of the State 9·01.

Of the 20,823 people who died during the year, 3,960 were under 5 years of age, 9,313 were aged from 5 to 64, and 7,538 were 65 and over. The ages of the remaining twelve adults were not specified. The rates per 1,000 living in the main groups, under and over 5 years, were 15·27 and 8·36 respectively, as compared with 18·38 and 8·35, the average of the previous five years.

Infantile Mortality.—The number of children under 1 year of age who died was 2,999, equal to 54·9 per 1,000 births. To this total the Metropolis contributed 1,255, or 57·0 per 1,000 births, and the remainder of the State 1,744, or 53·5 per 1,000 births. The rate for 1925 is 11 per cent. below the average of the previous five years. Of the deaths under 1 year of age, 1,264, or 42 per cent., occurred under 1 week, 1,627, or 54 per cent., under 1 month, and 2,052, or 68 per cent., under 3 months.

Causes of Death.—Of the deaths during the year, the most important causes were as shown in the following statement, which, for purposes of comparison, also gives the average number of deaths during the preceding five years, due allowance having been made for increase in population :—

Causes of Death.	Number, 1925.	Average Number, 1920–24.	Increase (+) or Decrease (–) in 1925.	Causes of Death.	Number. 1925.	Average Number, 1920–24.	Increase (+) or Decrease (–) in 1925.
			per cent.				per cent.
Typhoid Fever	80	119	— 33	Other Diseases of the Circulatory System	57	135	— 58
Measles	30	89	— 66	Bronchitis	422	496	— 15
Scarlet Fever	27	18	+ 50	Pneumonia	1,545	1,559	— 1
Whooping-cough	323	188	+ 72	Other Diseases of the Respiratory System	282	285	— 1
Diphtheria	119	250	— 52	Diseases of the Stomach ...	123	151	— 19
Influenza	143	350	— 59	Diarrhœa and Enteritis (under 2 years)	532	1,031	— 48
Plague	...	2	...	Diarrhœa and Enteritis (2 years and over	140	303	— 54
Erysipelas	27	34	— 21	Appendicitis	178	180	— 1
Infantile Paralysis	4	11	— 64	Hernia, Intestinal Obstruction	218	213	+ 2
Lethargic Encephalitis	34	24	+ 42	Cirrhosis of the Liver	93	116	— 20
Epidemic Cerebro-spinal Meningitis	27	29	— 7	Other Diseases of the Digestive System	289	303	— 5
Other Epidemic Diseases ...	48	46	+ 4	Bright's Disease (Acute and Chronic)	1,119	1,051	+ 6
Tuberculosis, Respiratory System	1,023	1,187	— 14	Other Genito-Urinary Diseases	337	369	— 9
Tuberculous Meningitis	47	60	— 22	Puerperal Septicæmia	87	92	— 5
Other Tuberculous Diseases ...	80	87	— 8	Other Puerperal Diseases ...	238	218	+ 9
Cancer	2,133	1,985	+ 7	Malformations	228	253	— 10
Diabetes	270	268	+ 1	Congenital Debility	251	341	— 26
Leucæmia, Anæmia, Chlorosis ...	191	209	— 9	Prematurity	852	949	— 10
Other General Diseases	560	451	+ 24	Other Developmental Diseases	294	296	— 1
Meningitis	141	153	— 8	Senility	1,078	1,170	— 8
Cerebral Hæmorrhage	873	705	+ 24	Suicide	263	247	+ 6
Insanity	142	156	— 9	Accident...	*1,121	1,031	+ 9
Convulsions of Infants	53	83	— 36	All other Causes	468	497	— 6
Other Diseases of the Nervous System	653	562	+ 16				
Diseases of the Heart	3,067	2,698	+ 14				
Diseases of the Arteries, Atheroma, etc.	513	554	— 7	Total	20,823	21,604	— 4

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* Includes 227 from motor accidents.

Epidemic Diseases.—The deaths from epidemic diseases numbered 862 as compared with an average of 1,160 during the previous five years, a decline of 26 per cent. The deaths from whooping-cough numbered 323, an experience which was 72 per cent. greater than the average of the previous five years.

Tuberculosis of the Respiratory System was the cause of 1,023 deaths in 1925, the rate, ·45 per 1,000 living, being 14 per cent. below the average of the five years 1920–24. Speaking generally, the death-rate from tuberculosis has been declining for some years past. The deaths of males numbered 614, and of females 409, and the rates per 1,000 living were ·53 and ·37 respectively. The mortality from other tuberculous diseases was 14 per cent. below the average.

Cancer.—The deaths from cancer numbered 2,133, equal to a rate of ·94 per 1,000 living, and 7 per cent. above the average of the preceding quinquennial period. The deaths of males numbered 1,163 and of females 970, the rates for each sex being 1·00 and ·87 per 1,000 respectively. The death-rate from this disease has been increasing steadily for a number of years.

Cerebral Hæmorrhage.—To cerebral hæmorrhage and apoplexy during 1925 were ascribed 873 deaths, of which 439 were those of males and 434 of females. The rate was ·38 per 1,000 living, or ·38 for males and ·39 for females. The higher rate for this disease, viz., 24 per cent. above the average, may be attributed to the fact that during 1925 a revised manual of joint causes of death, based on the 1920 International list was adopted. In this manual cerebral hæmorrhage as a cause of death receives greater weight than was formerly the case—notably when stated in combination with diseases of the arteries, atheroma, &c.

Diseases of the Heart were the cause of 3,067 deaths, the rate being 1·35 per 1,000. The apparent increase in these deaths during the last twenty-five years is probably the result of the greater attention given to pathological diagnoses. The rate in 1925 was 14 per cent. above the average of the preceding five years. Of the total deaths, 1,760 were of males and 1,307 of females, the corresponding rates per 1,000 living of each sex being 1·52 and 1·17.

Bronchitis and Pneumonia.—Bronchitis with 422 deaths, equal to a rate of ·19 per 1,000 living, showed a decrease of 15 per cent., and pneumonia with 1,545 deaths, or ·68 per 1,000, a decrease of 1 per cent. as compared with the experience of the previous five years.

Of the deaths from bronchitis, 222 were of males and 200 of females, or ·19 and ·18 per 1,000 living respectively. Of the persons who died from pneumonia, 868 were males and 677 were females, and the rates were ·75 and ·61 per 1,000 living of each sex.

Bright's Disease.—During 1925 there were 1,456 deaths due to diseases of the genito-urinary system, of which 1,119 were caused by acute nephritis and Bright's disease. The rate for nephritis (acute and chronic) was ·49 per 1,000 living; for males ·60 per 1,000, and for females ·38 per 1,000. In 1925 the rate was 6 per cent. more than the average of the previous five years. The general tendency of the rate has been to increase.

Senility.—The deaths from this cause numbered 1,078, equivalent to a rate of ·47 per 1,000 living, or 8 per cent. less than the average during the years 1920–24. Many deaths formerly attributed to senility are now ascribed to some form of heart disease, with the result that deaths from senility, so described, have shown a considerable decrease.

Of the total deaths from senility, 643 were males and 435 females; the corresponding rates per 1,000 living were ·55 and ·39.

Diseases of Infants.—The principal causes were prematurity 852, other developmental diseases 760, diarrhœa and enteritis 421, pneumonia 357, whooping-cough 207, bronchitis 59, and convulsions 42.

The following statement shows the causes of deaths of children under 1 year of age, per 1,000 births, during 1925, in comparison with the preceding five years :—

Causes of Death.	Males.		Females.		Total.	
	1925.	1920-24.	1925.	1920-24.	1925.	1920-24.
Epidemic Diseases	4·3	3·4	5·5	3·4	4·9	3·4
Tuberculous Diseases	·3	·3	·3	·2	·3	·3
Syphilis	·2	·3	·3	·3	·3	·3
Meningitis	·7	·7	4	·6	·5	·6
Convulsions	·9	1·2	·6	1·0	·8	1·1
Bronchitis	1·1	1·4	1·0	1·3	1·1	1·3
Pneumonia	7·0	5·6	6·0	4·9	6·5	5·3
Diarrhœa and Enteritis	8·7	15·3	6·7	12·2	7·7	13·8
Premature Birth	16·4	17·7	14·7	12·5	15·6	15·1
Other Developmental Diseases ...	15·5	18·4	12·3	14·5	13·9	16·5
Other Causes	3·7	4·1	3·0	3·2	3·3	3·7
All Causes	58·8	68·4	50·8	54·1	54·9	61·4

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A.—PUBLIC HEALTH ADMINISTRATION.

CHEMICAL LABORATORY.

REPORT OF GOVERNMENT ANALYST FOR THE YEAR ENDED 31st DECEMBER, 1925.

Staff.

Government Analyst: Thomas Cooksey, Ph.D., B.Sc., F.I.C., F.A.C.I.
Second Government Analyst: William M. Doherty, F.I.C. A.A.C.I.
Senior Assistant Government Analyst: Sidney G. Walton, A.A.C.I.
Assistant Government Analyst: H. B. Taylor, M.C., D.Sc., A.A.C.I.
Analyst: A. D. Dibley, A.S.T.C., A.A.C.I.
Assistant Analysts:
R. G. O'Brien, A.S.T.C., A.A.C.I.
Isabel Knight, B.Sc., A.A.C.I.
Laboratory Assistant: Frank M. Armer.
Laboratory Attendant: Victor Williams.
Junior Laboratory Attendant: Roland Lewis.
Clerk: Grace McGlynn.
Shorthand-writer and Typist: Nellie Armstrong.

The number of samples of all kinds examined in the Laboratory under my control during the year 1925 amounted to 18,337, comprising 16,110 samples examined for the purposes of the administration of the Pure Food Act, 1908, and 2,227 for the public services of the State.

A total of 15,060 samples of milk were examined for comparison with the standard formulated by the Pure Food Act. Of this number, 12,195 were collected in the metropolitan area, the proportion of adulterations being 3·1 per cent. of the total examined. The milk samples collected in country districts numbered 2,865, of which 113 (3·9 per cent.) did not conform to the standard. This percentage of adulterations is the lowest yet reported in country milks, and maintains the improvement shown in 1924. The proportion of adulterations in the combined city and country milk samples was 3·2 per cent.

The number of samples other than milk taken under the Pure Food Act amounted to 1,050, as compared with 864 in 1924, and 781 in 1923. The food samples totalled 978, of which 28·5 per cent. were adulterated or failed to accord with description. The remaining 72 samples consisted of drugs and medicines, 33.3 per cent. of which failed to conform with prescribed standards. These figures are not a true indication of the quality of the food and drug supply, since many of the adulterated articles consisted of samples taken in response to complaints or other information regarding quality.

ADULTERATIONS—

Among the adulterated foods were—

Beer—2 samples of which contained two preservatives.
Butter—1 sample rancid, and 1 contained excess moisture.
Cheese paste—2 samples contained excess preservative.
Chutney—1 sample fermented and the tin blown.
Cider—2 samples contained excess preservative. The question of the amount of preservative to be permitted is at present under investigation.
Coffee—1 sample of beans was mouldy. Two samples of coffee and chicory essence were deficient in caffeine.
Cream—8 samples were found to have been thickened by the addition of calcium sucrate; one was deficient in fat; and one contained preservative in contravention of the standard.
Essences—7 essences of lemon were found to be terpeneless, or imitation essences; 4 vanilla essences were also imitation essences; 4 vanilla essences were deficient in extract of vanilla bean, 1 was deficient in vanillin, and 2 were deficient in alcohol.
Fish paste—4 samples were artificially coloured in contravention of the regulation, and 1 was deteriorated and unfit for use as a food.
Flour—5 samples were deteriorated and unfit for use.
Ginger—3 samples were damaged by water and unfit for use.
Ice cream—17 samples were deficient in milk fat.
Jam—8 samples contained admixtures of apple pulp ranging from 12 to 25 per cent., and 1 sample had been prepared with fermented fruit.
Meat—79 samples of meat were illegally preservatised; 89 samples contained a permitted preservative in excess of the prescribed maximum; 6 contained excess saltpetre; 3 contained metal filings.
Infants' foods—2 samples were rancid; 9 contained wood fibre. As pointed out elsewhere, the question of the standard for infants' food is receiving attention.
Honey—1 sample was condemned owing to deterioration.
Spirits—1 sample contained added water.
Tomato sauce—6 samples contained excessive bacteria, due to the use of fermented fruit.
Vinegar—1 sample was deficient in acetic acid.
Wine—2 samples contained excess proof spirit, and 1 contained excess sulphurous acid.

Drug adulterations—

Acetylsalicylic acid tablets—1 sample contained free salicylic acid.
Bay rum—1 sample was deficient in alcohol.
Borax—6 samples contained arsenic in excess of the maximum permitted by the British Pharmacopœia.
Camphorated chalk—4 samples were deficient in camphor.
Artificial Carlsbad salts—The composition of 6 samples was not in accordance with the formula of the British Pharmaceutical Codex.
Cream of tartar—2 samples contained lead in excess of the permitted amount.
Eau-de-Cologne—1 sample was deficient in alcohol.
Iodine (*tincture*)—2 samples were prepared with methylated spirits, and were deficient in iodine and potassium iodide.
Medicine (*patent*)—1 sample contained excess proof spirit.

Infants' Foods.—The question of infants' food, the regulation in regard to which is regarded as unsatisfactory, formed the subject of special inquiry during the year, with a view to the recommendation for the consideration of the Advisory Committee of a standard which will more nearly meet requirements. The present standard does not permit of the presence of wood fibre. On analysis it was found that all the infants' foods submitted for examination, with the exception of those prepared from dried milk only, contained fibre.

Vanilla Essence.—Owing to the indefiniteness of the present standard in regard to the quantity of alcohol necessary to be used in the manufacture of vanilla essence and to be present in the final product, the difficulty of determining the genuine character of an essence is considerably increased. A number of samples obtained on the market were found not to conform to an essence which would be produced by following the procedure of the British Pharmaceutical Codex. Although the samples in question contained the proportion of vanillin required by the standard under the Pure Food Act, they were deficient in the extractive matter from the bean, and it is to this extractive matter that portion of the flavouring quality of the essence is due. From the analytical point of view it is most desirable that a definite standard for alcohol content should be demanded. For this reason I am of opinion that it would be desirable to revert to the standard previously in force in this State which required an alcohol content of 50 per cent. by weight in the finished product. Some of the samples submitted, which were said to have been put up in a concentrated form for use in the preparation of beverages, had been prepared from an extract of vanilla bean called oleo-resin. Essences manufactured according to directions from this product will not contain the extractives present in essences prepared in accordance with the formula given in the British Pharmaceutical Codex. This formula is practically similar to the standard required under the Pure Food Act Regulation in force prior to the present standard.

A total of 2,227 samples were examined in connection with the public services of the State. These included 238 samples submitted by subsidised charities, consisting of foods for comparison with standard of supply, drugs for determination of purity, strength, and quality, and milk submitted for examination with a view to the control of dairy herds.

The Government Stores Department submitted 853 samples, details of which will be found in Table II, representing tenders and samples of supply. Beginning with an occasional item for investigation some twenty years ago, the work carried out for this department has shown a continued increase, until now between 800 and 900 samples are examined and reported on annually. The bulk of this work consists of the examination of and report on lubricants, disinfectants, and inks, and in each instance the supply of these articles, and, indeed, of all articles required for the Public Services and for which contracts are arranged, has been systematised and now works smoothly, in marked contrast to the unsatisfactory and uneconomic method of the past.

A great many analyses have been carried out in connection with the standardisation of lubricants, and a specification has been adopted which is working satisfactorily.

The maintenance of the strength of disinfectants supplied by the Government Stores Department to, Government departments is of considerable importance in the disinfection of public buildings, theatres, picture shows, &c., and the probable prevention of disease. As in the case of lubricants, a satisfactory condition of tender and supply has now been arrived at in this connection.

The question of writing inks is also of some importance, and local manufacturers in their dealings with the Stores Department have been encouraged to produce a satisfactory article. The consequence of a continued refusal to accept tenders owing to defects in the samples tendered has eventuated in the production of an ink which is quite as good as the imported article. The Government thus has the benefit of a good ink at a reduced price. There is still, however, a certain amount of prejudice against the use of the ink supplied, and complaints arise occasionally, but in no case so far, except during the war period when it was difficult to procure suitable dyestuffs, have the serious allegations made against the locally manufactured supply been sustained.

Besides the articles mentioned above, the list shows the degree to which analytical control of supplies has been applied. Committee meetings have been attended and interviews given in connection with the formation of standards by the officer to whom the work of the Stores Department has been entrusted since its inception. All this has entailed much work and application to the various problems as they arose, cumbrous and lengthy methods have given place to more rapid processes of analysis, and it is thus made possible to keep pace with the volume of work involved.

The work done in connection with the examination of the various items submitted by the Stores Department has also included foods and drugs and a variety of miscellaneous articles.

The Pharmacy Board submitted seven samples for examination in connection with cases taken against unlicensed vendors selling scheduled poisons.

The Police Department requested the examination of ninety-two exhibits in connection with criminal investigations. These examinations were undertaken in connection with charges of attempted murder, incendiarism, assault, robbery, conspiracy, supplying abortificients, drunkenness, false pretences, selling liquor without license, laying poison baits, supplying drug addicts with cocaine, morphine, &c.

Forty-seven exhibits of human viscera were submitted in connection with coroners' inquiries respecting deaths from suspected poisoning, 22 of which gave negative results on chemical examination. In 14 cases, death was due to strychnine poisoning, 3 deaths were due to barbitone (veronal), 2 to cyanide, and 1 each to mercury, opium, morphine, arsenic and copper ("Paris green"), cresylic acid, and strychnine and phenol-phthalein (derived from Alophen pills).

Eight exhibits of animal viscera were submitted by the police for examination in cases of suspected stock poisoning, no poisons being found in three cases, strychnine in two, arsenic in two, and phosphorus in one case.

A total of 335 samples of water were analysed during the year. These included samples taken for the purpose of exercising supervision over the suitability for domestic and industrial use of the supplies of country towns, and waters taken from temporary sources of supply the use of which was rendered necessary by drought conditions obtaining in certain country districts. By request of the Commonwealth Meteorological Bureau samples of rain water have been systematically examined during the year with a view to the determination of the chlorine content.

110 samples of sewage were submitted for examination for the purpose of testing the efficiency of sewage tank installations in country districts.

A good deal of work has been undertaken at the request of the medical officer in charge of the Industrial Hygiene Branch of the Department to assist him in his investigation into occupational diseases, and the conditions which cause them. A total of 385 specimens were submitted to chemical analysis in this connection, the detailed list of which is shown in Table II.

In addition two of my officers have devoted a good deal of time to investigating various methods of analysis for the estimation of minute traces of lead in urine, fæces, and foods. This work has been undertaken with a view to the selection of the most suitable and convenient method for routine analysis. The electrolytic and chemical methods have both been under review, and, with suitable modifications, both have been found to give satisfactory results. In the final stages of both, the lead present is estimated by its precipitation as sulphite.

As a result of this inquiry, the conclusion has been reached that all urine (at least in respect to people living under the usual city conditions) contains lead; the average amount being in the vicinity of 0·03 mgm. per litre, or 3 parts per 100,000,000. The electrolytic and chemical methods were confirmatory of each other in this connection, though the results from the first-named method were slightly higher than those obtained from the use of the chemical method.

152 specimens were analysed for miscellaneous authorities. These comprised air submitted in connection with investigations into ventilation conditions, foods as regards deterioration or injurious ingredients, drugs and patent medicines, preservative substances, poison baits, soil in respect to the suitability of proposed sites for sewage tank installations, rubber solution, disinfectants, &c. An electric water-heating apparatus which had formed the subject of complaint was examined. It was found that when water was heated to boiling point in this apparatus, which consisted of an immersion element to be used with an alternating current, a precipitate containing copper and nickel was deposited in the water. The total amount of metallic contamination this caused, however, amounted only to five parts per million.

In accordance with the practice of some years past, a number of samples of human milk were examined for Baby Clinics.

Samples of flock and feathers were examined for comparison with standards established under the Noxious Trades Act. Further investigation is required in regard to the chemical examination of feathers for determining the cleanliness, and suitability for use in the manufacture of mattresses, pillows, &c.

I attach, herewith, tables showing details of the whole of the samples examined.

THOMAS COOKSEY,
Government Analyst.

Table I.—Samples examined during the year 1925 for the purposes of the administration of the Pure Food Act, 1908.

Nature of Sample.	Authority submitting—	Samples.	
		Number examined.	Number Adulterated or Falsely Described.
Acetyl Salicylic Acid Tablets.	Food Inspectors ...	1	1
Ale	,, ...	3	...
Barley—(Patent)	,, ...	1	...
Bay Rum	,, ...	1	1
Beer	,, ...	7	2
Borax	,, ...	7	6
Bread	,, ...	4	...
Breakfast Foods	,, ...	9	...
Butter	,, ...	21	2
Camphorated Chalk	,, ...	4	4
Carlsbad Salts	,, ...	7	6
Cheese	,, ...	10	2
Chutney	,, ...	1	1
Cider	,, ...	4	2
Coffee Beans, Ground Coffee, Coffee Essence.	,, ...	48	3
Confectionery	,, ...	3	...
Cough Lozenges	,, ...	1	...
Cream of Tartar	,, ...	20	2
Cream	,, ...	50	10
Disinfectant Powder	,, ...	1	...
Eau-de-Cologne	,, ...	1	1
Egg Pulp, Dried Eggs, &c.	,, ...	3	...
Egg Substitute	,, ...	4	...
Essences (Flavouring)	,, ...	39	18
Fish (Tinned, Fresh, &c.)	,, ...	11	...
Fish Paste	,, ...	13	5
Flour	,, ...	7	5
Ginger	,, ...	3	3
Groats	,, ...	1	...
Honey	,, ...	20	1
Ice Cream	,, ...	99	17
Infants' Foods	,, ...	18	11
Iodine	,, ...	3	2
Jam	,, ...	81	9
Lard	,, ...	8	...
Liquorice	,, ...	4	...
Meats (various)	,, ...	434	177
Meat Extract	,, ...	2	...
Meat Paste	,, ...	5	...
Medicines (Patent, &c.)	,, ...	10	1
Milk—Fresh	Metropolitan Food Inspectors.	7,638	302
,, ,,	Metropolitan Local Authorities	4,557	81
,, ,,	Country Food Inspectors.	1,022	68
,, ,,	Country Local Authorities	1,843	45
,, Condensed, Dried ...	Food Inspectors ...	5	...
Molasses	,, ...	2	...
Olive Oil	,, ...	3	...
Peas (Bottled)	,, ...	1	...
Pepper	,, ...	11	...
Pills and Tablets	,, ...	10	...
Powders (Medicinal)	,, ...	2	...
Preservative	,, ...	1	...
Prunes	,, ...	1	...
Spirits	,, ...	8	...
,,	Licensing Inspector.	2	1
Tomato Sauce	Food Inspectors ...	11	6
Vinegar	,, ...	4	1
Wine	,, ...	11	3
	Total	16,101	799

TABLE II.—SAMPLES examined during the year 1925 in connection with the Public Services of the State.

Authority Submitting.	Nature of Sample.	No. of Samples.
Subsidised Charities	Absolute alcohol	1
,, ,,	Bread	26
,, ,,	Cake	1
,, ,,	Chaulmoogra oil	1
,, ,,	Cocoa	2
,, ,,	Flavouring essences	1
,, ,,	Flour	4
,, ,,	Maizemeal	1
,, ,,	Meat (sausages)	1
,, ,,	Milk	185
,, ,,	Morphine	5
,, ,,	Mustard	1
,, ,,	Oatmeal	1
,, ,,	Peaches (dried)	1
,, ,,	Pears (dried)	1
,, ,,	Sago	1
,, ,,	Sugar	1
,, ,,	Tobacco	1
,, ,,	Vinegar	3
Government Stores Department.	Apple pulp	1
,, ,,	Antiphlogistine substitute	2
,, ,,	Beeswax	6
,, ,,	Canvas	5
,, ,,	Chicory	75
,, ,,	Cocaine hydrochloride	1
,, ,,	Disinfectants	146
,, ,,	Flavouring essence	1
,, ,,	Ink and ink powders	79
,, ,,	Insecticide	1
,, ,,	Linseed Oil	2
,, ,,	Lubricants	140
,, ,,	Condensed milk	4
,, ,,	Opium	1
,, ,,	Paper	2
,, ,,	Petrol	1
,, ,,	Piping	3
,, ,,	Serge	1
,, ,,	Semolina	1
,, ,,	Soap	318
,, ,,	Spiritous liquors	13
,, ,,	Turpentine	2
,, ,,	Waterproof cloth	42
,, ,,	Wood-preserving oil	2
,, ,,	Zinc white, Zinolin	4
Pharmacy Board	Cocaine	1
,, ,,	Cyanide	1
,, ,,	Lysol	4
,, ,,	Strychnine	1
Police Department	Criminal investigations	91
,, ,,	Human viscera	48
,, ,,	Animal viscera	8
Departmental and other Authorities	Water	335
,, ,,	Sewage	110
Departmental and other Authorities (exhibits *re* occupational diseases)	Apron	1
,, ,,	Boiler tubing	1
Departmental and other Authorities (exhibits *re* occupational diseases)—*ctd.*	Brass	1
,, ,,	Dust	12
,, ,,	Faeces	62
,, ,,	Frit	4
,, ,,	Glaze	4
,, ,,	Paint	8
,, ,,	Post-mortem specimens	1
,, ,,	Sand	1
,, ,,	Stone	1
,, ,,	Sweepings	4
,, ,,	Tiles	5
,, ,,	Tin	2
,, ,,	Tooth	1
,, ,,	Slag	1
,, ,,	Urine	274
,, ,,	Zinc	2
Miscellaneous Authorities	Air	22
,, ,,	Apricots (tinned)	...
,, ,,	Baits (poisoned)	2
,, ,,	Bread	8
,, ,,	Cheese	1
,, ,,	Cider	8
,, ,,	Can-sealing solutions	4
,, ,,	Cod liver oil emulsion	1
,, ,,	Confectionery	1
,, ,,	Disinfectants	2
,, ,,	Drink cure	1
,, ,,	Electric water heater	1
,, ,,	Ethyl-chloride	1
,, ,,	Flock, feathers, &c.	15
,, ,,	Glue	1
,, ,,	Groats	1
,, ,,	Hair	3
,, ,,	Infants' foods	2
,, ,,	Kapok	4
,, ,,	Leather	2
,, ,,	Liquid (inflammable)	2
,, ,,	Ferro-manganese alloy	1
,, ,,	Medicines (patent, &c.)	7
,, ,,	Human milk	28
,, ,,	Ointment	1
,, ,,	Peaches (tinned)	1
,, ,,	Pears (tinned)	1
,, ,,	Exhibits *re* poisons	3
,, ,,	Powders (medicinal)	2
,, ,,	Preservative substances	2
,, ,,	Rubber solution	15
,, ,,	Scum from water (sea baths).	1
,, ,,	Soil	3
,, ,,	Stomach washings	1
,, ,,	Sugar	1
,, ,,	Syrup	2
,, ,,	Ticking	1
	Total	2,227

PURE FOOD ACT, 1908.

REPORT OF THE CHIEF INSPECTOR ON THE GENERAL ADMINISTRATION OF THE PURE FOOD ACT, 1908, FOR THE YEAR ENDED 31st DECEMBER, 1925.

Staff.

Chief Inspector: ARTHUR KENCH.

Metropolitan Inspectors: GUY A. GRIFFIN, JOHN WILLIAMS, WILLIAM H. EILBECK, ARTHUR C. PATTON, WILLIAM ALLISON, PHILLIP C. WILLIAMS, JOHN BOLTON, ROBERT FARLOW, JOSEPH H. SHIELS, FRANK BLAKE, RUPERT CUMMINS.

Country Inspectors: Senior Inspector CHARLES V. FRANCIS, ROBERT HORNE.

Assistant: WALTER J. MADGWICK.

I HAVE pleasure in submitting a report of the work performed during the year by officers of the Pure Food Branch. The executive work under the Pure Food Act includes the supervision of all places where food or drugs are prepared, stored, or exposed for sale. Particular attention is given to the supervision of the milk supply; to the manufacture of jams, and fruit and vegetable preserving; condiments, smallgoods, and cordials; and to the general conditions of grocery, fruit, vegetable, fish, and meat shops, both wholesale and retail.

Bread Supply.—Special inspectorial work has been carried out in connection with the preparation and delivery of bread and pastry, and many bakeries have been remodelled and repairs effected under the supervision of departmental officers.

Milk Supply.—In connection with the supervision exercised over the milk supply 8,640 samples were procured by departmental officers and submitted for analysis to the Government Analyst. Prosecutions successfully undertaken against traders who were defrauding the public by supplying adulterated milk numbered 163, and the fines and costs recovered in connection therewith totalled £744 6s.

Cream.—Forty-four samples were procured, resulting in four prosecutions, the fines and costs amounted to £41 12s. The adulteration in these cases consisted of deliberate addition as a preservative of formalin in some instances and calcium sucrate in others.

Ice Cream.—A special investigation was carried out in connection with the manufacture and sale of ice cream. One hundred and one samples were submitted for analysis, and in eight prosecutions the fines and costs amounted to £21.

Meat: Preservative Substances: Use of Dusting Powders.—The question of preservation of meat has been thoroughly investigated; 436 samples of meat, including sausages, were procured and submitted to the Government Analyst for analysis; in 79 cases it was found that traders had been dusting the surface of the meat with preservative powder; warnings were issued pending ministerial consideration as to prosecution.

Sulphur Dioxide.—Seventy-one prosecutions were instituted for an excess of sulphur dioxide in sausages, resulting in the imposition of fines and costs amounting to £208.

Other Foods and Drugs.—A total of 1,082 samples of foods and drugs were submitted for analysis and 99 traders were prosecuted, the fines and costs amounting to £317.

Premises Used for Preparation, Sale and Storage of Food.—Inspections were made of 12,196 premises used for or in connection with the preparation, sale, or storage of food. Prosecutions undertaken for unclean premises, &c., numbered 106, the fines totalling £573. In addition over 997 notices were served on traders requiring structural alterations to premises.

Seizure and Condemnation of Unsound Food.—During the year regular supervision has been exercised over food products stored in wholesale and retail stores. bulk stores, auction rooms and elsewhere, and over 60 tons of food stuffs and 200,000 packages of assorted foods were found to be in a damaged and deteriorated condition; these goods were seized and destroyed; 21 prosecutions were instituted and resulted in fines and costs amounting to £89.

Venereal Diseases Act.—At the request of the Commissioner administering this Act special investigations were made concerning breaches of the Act and three prosecutions were successfully undertaken. Fines and costs imposed amounted to £37.

Tables are appended showing the nature of the samples taken during the year and the class of food seized and destroyed. A detailed statement of the foods and drugs submitted for examination will be found in Table 1 of the Government Analyst's report (p. 16).

ARTHUR KENCH,
Chief Food Inspector.

TABLE I.—Summary of Work performed by Pure Food Officers for Year ending 31st December, 1925.

Milk Analysis.	Samples taken by—	
	Departmental Officers.	Municipal and Shire Council Inspectors.
Number of samples taken from all parts of the State	8,640	6,338
Number of samples below the standard	344	132
Number of warnings	181	90
Number of prosecutions	163	42
Amount of fines and costs	£744 6s.	£119 19s. 6d.

*Foods and Drugs, other than Milk.** (See Table I, p. 16.)

Number of samples taken from all parts of the State	1,082
Number of samples below the standard	256
Number of warnings	80
Number of prosecutions	99
Amount of fines and costs	£317 4s.

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*Local authorities (municipal and shire councils) do not, as a matter of routine, collect samples of food and drugs other than milk.

Food unfit for Consumption, Seized and Destroyed. (See Table II below.)

Number of prosecutions	21
Amount of fines and costs	£89

Inspection of Premises used for Preparation, Sale or Storage of Food.

Number of premises inspected in all parts of the State	12,196
Number of notices served	997
Number of prosecutions	106
Amount of fines and costs	£573 11s.

*General Breaches of Pure Food Act and Regulations**.

	Departmental Officers.	Municipal and Shire Council Inspectors.
Number of prosecutions	66	66
Amount of fines and costs	£224 5s. 6d.	£311 19s.

*Uncleanly habits in preparation, handling, delivery, or storage of food; use of dirty or unsuitable utensils, &c.

Summary of Legal Proceedings for Breaches of Pure Food Act and Regulations, 1925

	Prosecutions.	Fines and Costs. £	s.	d.
Adulterated milk	163	744	6	0
Adulterated foods and drugs	99	317	4	0
Goods seized and destroyed	21	89	0	0
Unclean premises	106	573	11	0
General breaches	66	224	5	6
Grand Total	455	£1,948	6	6

Prosecutions for breaches of the Venereal Diseases Act, 1918, 3; fines and costs, £37 4s.

Table II.—Showing nature of Food, &c., seized and destroyed by Departmental Pure Food Officers for period 1st January to 31st December, 1925.

Goods.	Quantity.					Prosecutions.	Fines and Costs.		
		tons.	cwt.	qr.	lb.		£	s.	d.
Bacon and ham	...	0	1	0	16	2	20	16	0
Baking powder	76 tins	......				...	...		
Barley	...	0	7	1	14	1	5	8	0
Biscuits	...	0	8	1	2	...	...		
Breakfast foods	...	1	1	0	16	...	...		
Butter	...	2	10	1	4	...	...		
Cakes	18	......				...	...		
Cocoa	893 tins	......				...	...		
Cocoanuts	...	0	0	2	5	...	...		
Coffee	...	0	19	2	24	...	...		
Confectionery	60 pkts. 10 tins	1	12	0	3	4	20	12	0
Condensed milk	558 bot. 1,046 tins	0	2	2	1	...	...		
Condiments	673 bot.	......				...	...		
Cordials	25 bottles	0	0	2	6	...	...		
Cheese	87 tins	......				...	...		
Cream	129 tins	......				...	...		
Crockery	420 pieces	......				1	1	8	0
Fish	192,692 tins	15	0	1	21	3	16	4	0
Fish & Meat Paste	613 jars 106 tins	......				...	...		
Flour	...	6	2	0	23	1	5	8	0
Fruit, dried	...	5	5	0	14	...	...		
Fruit, preserved	371 tins	2	2	0	20	...	...		
Fruit pulp	...	5	7	2	7	...	...		
Fruit	35 dozen	......				2	4	16	0
General groceries	11 gall. 264 pkts. 43 tins 120 bot.	3	9	1	6	...	...		
Ginger	...	2	0	3	7	...	...		
Honey and Syrup	...	1	15	3	20	...	...		
Icing sugar	...	0	0	1	12	...	...		
Infants' food	40 tins	......				...	...		
Jam	756 tins	2	1	3	26	1	2	8	0
Linseed	...	0	0	0	6	...	...		
Macaroni	21 tins	1	9	3	13	1	2	8	0
Margarine	...	0	0	2	0	...	...		
Meat	...	0	15	2	5	5	9	12	0
Milk	192 gal. 28 tins	......				...	...		
Mustard	...	0	0	0	9	...	...		
Nuts	54 bags 54 pkts. 7 cases	0	4	2	3	...	...		
Olives	...	0	0	0	12	...	...		
Rice	7 bags	......				...	...		
Sausage skins	...	0	0	2	19	...	...		
Soup	46 tins	0	1	0	14	...	...		
Sugar	...	0	1	3	21	...	...		
Tapioca	...	0	0	3	22	...	...		
Tea	...	0	4	0	2	...	...		
Vegetables	70 bush. 176 tins 5 bags	1	2	2	2	...	...		
		54	10	1	11	21	89	0	0
Total—Tins	196,520								
Bottles & Jars	1,989								
Bags	66								
Bushels	70								
Cases	7								
Cakes	18								
Crockery (pieces)	420								
Gallons	203								
Packets	378								
	199,671								

Table III

Summary of Work performed by Departmental Pure Food Inspectors under the Pure Food Act, 1908, from 1st October, 1909, to 31st December, 1925.

Annual Number of Milk Samples Collected.

Year.	No. of Samples Collected.	No. below Standard.	No. of Prosecutions.	Amount of Fines and Costs.		
				£	s.	d.
1909-10	2,155	279	185	860	5	7
1911	1,963	248	132	829	9	6
1912	2,990	436	210	1,124	4	0
1913	3,519	322	144	709	17	0
1914	3,980	291	189	837	11	0
1915	4,338	312	196	803	17	0
1916	3,013	230	115	496	17	0
1917	3,241	268	122	598	15	0
1918	4,015	371	159	774	6	0
1919	3,592	476	178	970	19	0
1920	6,022	536	243	1,697	10	0
1921	7,865	263	146	846	5	0
1922	6,702	399	140	685	12	6
1923	8,485	414	201	1,043	5	6
1924	8,805	327	149	747	13	0
1925	8,640	344	163	744	6	0
	79,325	5,546	2,672	£13,770	13	1

Samples of Food and Drugs Collected (other than Milk).

Year.	No. of Samples Collected.	No. below Standard.	No. of Prosecutions.	Amount of Fines and Costs.		
				£	s.	d.
1909-10	391	49	41	150	4	0
1911	830	245	171	451	0	6
1912	593	71	71	148	17	0
1913	641	107	72	174	12	6
1914	774	135	71	321	4	0
1915	572	69	31	149	6	0
1916	557	172	50	235	12	0
1917	449	139	58	118	6	0
1918	456	131	25	48	4	6
1919	822	205	41	172	14	0
1920	1,080	207	19	65	15	0
1921	888	169	20	69	2	0
1922	758	121	17	47	3	0
1923	415	163	55	132	13	0
1924	834	166	93	348	2	0
1925	1,082	256	99	317	4	0
	11,102	2,410	934	£2,949	19	6

Return showing number of Premises Inspected annually.

Year.	No. of Inspections made.	Prosecutions for Dirty and Unclean Premises.	Fines and Costs.		
			£	s.	d.
1909-10	802	46	94	14	6
1911	929	50	235	12	0
1912	982	88	305	1	2
1913	2,600	93	382	7	6
1914	3,953	152	638	15	6
1915	3,561	71	284	9	6
1916	4,731	95	493	1	6
1917	5,997	166	811	12	5
1918	5,785	106	686	5	11
1919	5,330	38	239	3	6
1920	9,159	107	449	16	6
1921	10,621	109	574	4	0
1922	9,246	111	587	12	0
1923	10,681	159	821	18	6
1924	12,188	112	703	0	6
1925	12,196	106	573	11	0
	93,761	1,669	£7,881	5	2

*General Breaches of Act and Regulations.**

Year.	No. of Breaches.	Prosecutions.	Fines and Costs.		
			£	s.	d.
1909-10	47	36	63	9	0
1911	67	26	57	11	0
1912	72	60	114	8	6
1913	65	40	127	0	6
1914	71	42	167	7	6
1915	80	55	163	15	6
1916	90	21	154	8	6
1917	137	47	376	16	2
1918	200	131	375	12	10
1919	...	69	274	2	8
1920	...	83	368	2	0
1921	...	113	634	10	4
1922	...	72	252	19	0
1923	...	119	293	4	0
1924	...	47	185	1	6
1925	...	66	224	5	6
	829	1,018	£3,832	14	6

Includes unclean methods in preparation, handling, or delivery of food; use of dirty or unsuitable utensils; storage of food in sleeping rooms, lavatories, &c.

Summary of Legal Proceedings, 1909 *to* 1925.

Year.	Prosecutions.	Fines and Costs.		
		£	s.	d.
1 Oct., 1909-31 Dec., 1910	281	1,168	13	1
1911	379	1,573	13	0
1912	439	1,693	10	8
1913	349	1,393	17	6
1914	454	1,964	18	0
1915	369	1,561	10	0
1916	371	1,457	8	0
1917	513	2,162	17	7
1918	468	2,198	9	3
1919	338	1,896	14	2
1920	452	2,581	3	0
1921	388	2,124	1	4
1922	340	1,573	6	6
1923	562	2,450	11	0
1924	401	1,983	17	0
1925	455	1,948	6	6
Total ……… ………..	6,559	£29,712	16	7

Venereal Diseases Act, 1918.—Prosecutions undertaken by direction of the Commissioner administering the Venereal Diseases Act, 1918 (see p. 47):—1923, 9 prosecutions; 1924, 3 prosecutions; 1925, 3 prosecutions.

DAIRIES SUPERVISION ACT, 1901.

CATTLE SLAUGHTERING AND DISEASED ANIMALS AND MEAT ACT, 1902.

Report by the Chief Dairy Inspector on the activities of the Dairies Supervision Branch, Department of Public Health, for the year ending 1925.

Staff.

W. A. Mackie, Senior Inspector, Camden.
J. G. R. Bocking, Maitland.
S. C. Flood, Murwillumbah.
J. S. Lyons, Grafton.
J. Lacey, Taree.
R. A. Faunce, Singleton.
W. G. Johnston, Casino.
F. J. Madden, Sydney.
V. M. Nevell, Kiama.
F. J. Page, Kempsey.
C. A. Johnston, Lismore.
C. A. Moffitt, Bega.
T. W. Hanmer Tamworth.
A H. Smith, Moss Vale.
C. H. Nepean, Wagga.
A. J. Mackie, Bathurst.

Number of miles travelled in inspectorial work, 92,345; dairy premises inspected, 14,017; dairy cattle inspected, 448,544. Number of dairy cattle condemned—for tuberculosis, 579; actinomycosis, 172; cancer, 96; other diseases, 14; total, 861. Number of cattle submitted to the tuberculin test, 468; reacted, 62.

During the year 4,960 milch, and 1,349 dry cows were inspected at Flemington Milch Cow Saleyards. These yards are the principal port of entry into the suburban dairies, thus affording an opportunity for a close examination of all dairy cows which are sold at this centre for the purpose of producing milk for human consumption in the city and suburbs. The health of the animals forwarded for sale was satisfactory, and none were condemned.

Cattle Slaughtering.—Six hundred country slaughtering premises were visited; beef cattle examined, 1,114; condemned, 7 (tuberculosis 6, actinomycosis 1).

North Coast Bacon Factories.—Meat inspectors are stationed at North Coast centres:—O. H. Lowe and H. J. Kirkland (Byron Bay), A. J. Clogg (Lismore), G. R. McCredie (Ballina), J. Elliott (Grafton), J. Abberton (Toorooka).

The number of animals slaughtered for human food, all of which were subjected to a searching post-mortem examination by the above staff, is as follows:—Bulls, 76 (condemned for tuberculosis, 8); bullocks, 1,641 (tuberculosis, 33); cows, 3,253 (tuberculosis, 158); pigs, 64,329 (tuberculosis 738); calves, 260 (0); sheep, 2,483 (0).

Prosecutions.—167 prosecutions were instituted for breaches of the respective Acts governing the work of this branch, and the defaulting traders were mulcted in fines and costs to the extent of £578 19s. 11d.

Staff.—The appointment of Mr. C. H. Nepean to the southern area of the State with Wagga as headquarters, and Mr. A. J. Mackie to the western portion with Bathurst as headquarters, has been productive of good results. Many of the local centres in each district had not been thoroughly inspected previously, and as dairying, despite the remunerative price of wool, is steadily progressing inland, it is essential for the benefit of the industry that participants therein should be thoroughly conversant with what is required of them by legislation framed to protect the consumer as well as assisting the producer. The need of additional appointments to the staff is still stressed, as, especially on the North Coast, more officers are needed to effectively supervise the thickly populated areas which are utilised for dairying.

All the cattle kept at the State hospitals and institutions controlled by this Department have been regularly tested with tuberculin with gratifying results, and the addition, by purchase, of valuable animals from high-producing herds will undoubtedly further enhance the value of the pure bred Shorthorn and Friesian departmental herds.

T. V. BLOMFIELD,
Chief Dairy Inspector.

Summary showing the number of registered dairymen and milk vendors, and approximate number of dairy cattle on registered premises in New South Wales at 31st December, 1925, compiled from returns supplied by local authorities under the Dairies Supervision Act:—

District.	Number of Registered Dairymen.	Number of Milk Vendors.	Number of Dairy Cattle on Registered Premises.
Municipalities—			
Metropolitan	241	3,000	7,174
Extra Metropolitan	132	250	2,074
	373	3,250	9,248
Metropolitan Police	167	89	3,067
	540	3,339	12,315
Country Municipalities	2,264	717	62,280
	2,804	4,056	74,595
Police Districts	19,090	286	838,476
Total	21,894	4,342	913,071

REPORT OF THE CHIEF SANITARY INSPECTOR FOR THE YEAR ENDED 31st DECEMBER, 1925.

Inspectorial Staff.—Chief Inspector, E. A. CRESSWICK, Cert.R.S.I. Sanitary Inspectors: T. A. W. CURRY, Cert.R.S.I.; E. M. JACKSON, Cert.R.S.I.; S. L. PARSONS, Cert.R.S.I.; G. A. GARROW, Cert.R.S.I.; S. STONEY, Cert.R.S.I.

Sir,

I have the honor to submit the following report on the year's work:—

ROUTINE AND GENERAL WORK.

Inspection of Country Towns.—During the year systematic reinspections were carried out of 19 country towns and villages to ascertain what action the various local authorities had taken to carry out previous recommendations in regard to sanitary improvements recommended by this department. In one instance gross insanitary conditions were found to exist, with the result that the council of the district was later proceeded against in the police court, and fined. Generally speaking, however, an improvement in methods was noticed, and the local authorities appeared to be carrying out the recommendations.

Six outbreaks of infectious diseases in country towns and districts were investigated, reports submitted, and possible causes located.

Depots, Sites, &c.—Fifty-three proposed sites and 67 existing sanitary and garbage depots were inspected and reports submitted, recommending approval of new sites.

In some instances depots were found to be in an insanitary condition, pans not properly cleansed and nightsoil left exposed for lengthy periods, due to laxity of supervision. In these cases local authorities were notified to carry out the work in accordance with Local Government ordinances, or otherwise this department would be forced to take action in the matter. In most cases reinspection showed improvement in methods.

Insanitary Dwellings.—There are still a number of municipalities and shires who employ uncertificated inspectors. In these districts, as well as in some districts where certificated inspectors are employed, it has devolved on officers of this branch to carry out inspections of insanitary dwellings. During the year, 110 such premises were inspected, of which 65 were found to be in a condition unfit for human habitation or occupation. Certificates under the provisions of the Public Health (Amendment) Act, 1915, were issued to the local authorities recommending closure of the buildings. A large number of premises inspected, although not in such a state as to be unfit for habitation, needed extensive improvements, and these were recommended to be carried out. Sixty-four reinspections of insanitary dwellings were made to ascertain what action had been taken to have the premises placed in a healthy condition. In the majority of instances the requirements specified had been carried out, or work was in progress.

The increasing requests by local authorities in all parts of the State for inspection of insanitary buildings, the subsequent work involved and investigation of outbreaks of infectious disease, take up a considerable amount of time, and entail much expense, most of which would be unnecessary if all local authorities could be induced to employ certificated health inspectors. It appears desirable that such appointment be made mandatory, as is the case of New Zealand and South Africa, at least in all districts where there is considerable population. This would result in marked improvement in the public health of country centres. In Queensland the Commissioner for Public Health appoint health inspectors to the various areas without reference to the local authority.

Homebush Abattoirs.—Fifty-one inspections were made of the by-product plant and premises at the State Abattoirs. Comparatively few complaints have been received during the year. The plant has been maintained in efficient order, and some improvements in methods of treatment have been successful in minimising offensive odours.

General Inspections, &c.—Other matters investigated, inspections made, and reports submitted, comprise:—One hundred and six septic tanks and sites for same, 28 general complaints of nuisance, 21 sanitary services, 37 watercourses, 15 aborigines and other camps, 550 noxious trade premises, 37 slaughtering premises, 73 butchers and other food premises, 312 unhealthy building lands, 25 public hospitals, 47 private hospitals, new and existing, 21 public and 14 private schools, 223 theatres and picture shows, 47 dairies, 7 cemeteries, 205 wharves and ferries, 21 show grounds and racecourses, 4 country water supplies and 1 proposed scheme for water supply, 2 overflows from public sewers, 15 Government and public buildings, and 10 bedding factories. Plans and descriptions of 12 proposed scavenging areas were checked and reported on.

Telephone Bureaus.—Following upon complaints, inspections were made of several telephone bureaus in the city and adjoining suburbs, more especially with regard to the ventilation of the cabinet type of bureau. Recommendations were forwarded to the Postmaster-General's department setting forth alterations deemed necessary to provide for the adequate ventilation of such cabinets. After inspection with an officer from the Postal department several of the cabinets were fitted up on the lines recommended. The matter of having telephone cabinets regularly cleansed was also dealt with with beneficial results.

Plans, &c., Examined or Prepared.—This work comprised plans for 5 railway rest houses; 30 plans or tracings of unhealthy building areas, and 3 draft proclamations of such areas; examination of 155 plans for septic tanks submitted by municipal and shire councils for approval, and of 7 plans of hotels submitted by the licensing bench. In 2 cases evidence was given on behalf of the police and local authorities.

Pollution of Rivers and Watercourses.—Several inspections were carried out and investigations made into the alleged pollution of rivers and watercourses, particular attention being given to Parramatta River, Cook's River, Haslam Creek and Duck Creek. Twelve samples of water, sewage, excreta and septic tank effluent were collected and submitted to the Government Analyst or Principal Microbiologist for examination.

Ferry Steamers and Jetties.—Special attention was directed to the ferries and jetties following on complaints with regard to the offensive odours arising from the sanitary accommodation both on the steamers themselves and the jetties. In some instances it was found that the sanitary fittings were of an antiquated type, which no doubt accounted to some extent for the nuisance.

The Ferry Company was communicated with and requested to carry out improvements and instal more up-to-date fittings. The recommendations were carried out and improved conditions were noticed.

Water Supplies and Sewerage Schemes.—12 water supplies and storage reservoirs were inspected and reported upon, and two sewerage schemes were also thoroughly investigated with regard to possible pollution of the water in the rivers in the locality.

Flooded Areas in Country.—Owing to the abnormal rainfall in the Queanbeyan district the town became flooded, many premises being submerged. An officer visited the town to offer advice with regard to proper cleansing of the flooded houses and the carrying out of necessary repairs and alterations so as to render the buildings habitable. Ninety-four buildings were inspected and reports submitted, and the local authorities advised of necessary action.

Prosecutions.—During the year the following prosecutions were instituted and conducted by departmental inspectors as a deterrent to offenders for breaches of the various public health enactments and for the purpose of enforcing sanitary improvements in some of the country towns inspected where insanitary conditions were found to exist:—

Act under which information was laid.	No of Prosecutions.	Amount of Fines and Costs.
		£ s. d.
Cattle Slaughtering and Diseased Animals and Meat Act	2	9 18 0
Pure Food Act, Regulations	6	35 3 0
Ordinances, Local Government Act, 1919 (Nuisances)	1	4 9 0
Totals	9	49 10 0

Damp-proof Courses in Buildings.—Several samples of material were submitted for approval by the Board in accordance with Local Government Act, Ordinances 70 and 71, and were tested by the Testing Branch of the Public Works Department. One sample was approved, whilst the others, not being up to the standard, were rejected.

In making inspections in some of the country towns it was found that the local authorities were permitting materials to be used other than those specified in Local Government Ordinances 70 and 71 or approved of by this Department.

Samples of the materials were secured and the local authorities concerned were requested to prohibit their use as they were quite worthless as a dampcourse. It would appear desirable that more stringent regulations should be drafted so as to prevent use of any materials other than those approved of by this department or permitted by ordinance.

Sanitation of Hotels.—100 hotels were inspected and reports and recommendations in regard to them submitted to the department of the Attorney-General and Justice. These reports include structural defects, ventilation, lighting, cubic space, cleanliness, maintenance, disposal of wastes, drainage, and general sanitary conditions. The recommendations made indicate any alterations necessary, or the action that should be taken to remedy unsatisfactory conditions; and are forwarded for the information of the Licensing Reduction Board and for enforcement by the police.

In recent years in reinspecting hotels that have been previously inspected by departmental officers there has been noted a marked improvement in the sanitary accommodation provided, and in the ventilation and general maintenance of the buildings.

A number of the country hotels have lately been provided with septic tank installations which, besides being a great convenience to the travelling public, considerably improve the general sanitary conditions. A number of country hotels have also installed their own electric lighting plants, and hot-water services to the lavatory blocks; whilst others have installed various types of hot-water appliances for the convenience of patrons.

Chemical Closets.—One chemical closet was submitted for test. These closets have been installed at a number of private residences in various parts of the State with satisfactory results. If given reasonable care they eliminate the fly nuisance and prevent unpleasant odours arising, but the cost appears to prevent anything like general adoption. Eleven installations were inspected during the year.

Renovating Old Beds.—Following upon complaints from the employees where old beds are sent for reconditioning, samples of the material were obtained and submitted for examination. Regulations have now been drafted in connection with the collection and storage of rags and their manufacture into flock; for preventing the use of previously used flock, or feathers, unless cleansed in a prescribed manner; for provision of suitable apparatus for treatment of fibre, kapok, flock, or other material used in manufacture of bedding, upholstery, &c., so as to arrest dust arising during the process.

Theatres and other Public Halls.—During the year 223 inspections were made of theatres and public halls, special attention being directed to those situated in the city and metropolitan area. Reports were prepared and submitted to the Chief Secretary's Department requiring that a number of buildings and attached sanitary conveniences be placed in repair. In some instances premises were found to be in such a condition that cancellation of the license was recommended.

Numerous tests were made with the Kata thermometer of the air movements; and of the temperature during performances. The readings have been tabulated, and are now being considered with a view to formulating regulations for efficient ventilation of buildings used for public gatherings and entertainments.

Refusal of Noxious Trade License.—The registration of a knacker being again refused by the Bankstown Council, a license was issued by the Board of Health after numerous inspections of the premises made by departmental officers had shown that the premises and plant were maintained in a satisfactory manner.

Routine Destruction of Rats.—The whole of the shipping waterfront from Wooloomooloo Bay to Blackwattle Bay was systematically trapped throughout the year by the departmental ratcatchers, assisted by the ratcatching staff of the Harbour Trusts Commissioners, as well as privately employed catchers.

A total of 12,850 rats and 3,501 mice (16,351) caught by the staff were examined in the Microbiological Laboratory. All were found to be free from plague. There has been a falling off in the number of rats taken on the waterfront, no doubt due to the ratproofing of the buildings on the wharves, repairs to retaining walls, &c.

The death of one of the ratcatching staff (R. Fish) occurred during the year.

Temporary Absence of Staff.—One inspector was absent from this office for some weeks on relieving duty at the office of the Metropolitan Medical Officer of Health.

E. A. CRESSWICK,
Chief Inspector.

PRIVATE HOSPITALS ACT, 1908.

REPORT on the operation of the Act for the year ended 31st December, 1925, by F. M. SUCKLING, M.B., Ch.M., D.P.H.(Syd.), D.T.M. and H.(Camb.), Assistant Medical Officer of Health.

There were at the close of the year 620 licensed hospitals in the State (metropolitan area 252, country districts 368), an increase in the number on that of the previous year of nine (metropolitan increase 12, country hospital decrease 3). The metropolitan area, for the purposes of this report, is as previously pointed out that as shown in the map published in the New South Wales Railway Timetable, the remainder of the State being included in the term "country districts." Four hospitals received exemption from the provisions of the Act for the year. The inspection of hospitals was carried out on similar lines to that indicated in previous reports.

Routine departmental re-inspection of licensed hospitals was carried out as circumstances permitted. Thus apart from the metropolitan area, hospitals in the following country towns were visited and reported upon:—Ardlethan, Balranald, Braidwood, Coonamble, Deniliquin, Denman, Grafton, Jerilderie, Kandos, Leura, Lithgow, Liverpool, Muswellbrook, Newcastle and suburbs, Tamworth, and Wellington.

In most cases, re-inspection disclosed a satisfactory state of affairs, with the usual tendency of licenses to either improve their hospitals or to secure more suitable premises. Some licensees still need to be reminded as to the necessity of keeping their registers duly entered up to date. Renewal of license for one country hospital at the end of the year was refused owing to the licensee being unwilling to carry out improvements required. One country hospital licensee died during the year.

It is pleasing to note that the Bush Nursing Association in country districts is endeavouring to increase the usefulness of its aims by gradually establishing small hospitals licensed under the Act, and managed by the local Bush nurse. The Country Women's Association in its efforts to provide maternity accommodation for country people has also, on occasion, approached the Department with the view to licenses under the Act, pending such time as maternity blocks can be provided at local district hospitals.

Legal Proceedings.—One prosecution was undertaken at Gulgong for conducting a private hospital without a license, resulting in a fine of £20 and 12s. 6d. costs.

Exemptions.—Exemptions owing to remoteness were granted for the year 1925, in the cases of four hospitals, viz., at Goodooga, Numeralla, Wentworth, and Rye Park.

Sepsis connected with Pregnancy.—Sixteen cases were reported singly from sixteen licensed hospitals during the year, of which ten occurred in metropolitan hospitals and six in country hospitals. All of these hospitals were conducted by trained certificated nurses.

Investigations revealed that in one instance the infection into the hospital was probably due to the fact that the resident manager had previously nursed a "septic" outdoor case. It is to be noted that occasionally these septic patients are at first considered to be cases of scarlet fever, until later developments clear up the diagnosis.

It is possible that more septic cases occur in private hospitals than are actually notified, because some ambiguity exists in the minds of resident managers with reference to the list of definite diseases notifiable under the Act as given on the last page of the Regulations, and in regard to Regulations 16 and 20.

A special report was made by me during the year as to precautions taken with reference to surgical cleanliness, &c., as affecting lying-in cases in private hospitals where all classes of cases are admitted. The matter was raised at a meeting of the Board of Health when considering an application from a doubly certificated nurse in a country town for a license to include all cases. Extracts from this report are as follows:—

"Regarding this matter, private hospitals licensed for medical, surgical, and lying-in cases might be considered under three headings:—

"(1) Large hospitals such as exist in the metropolitan area, where the admission of a lying-in patient is but a rare event, *e.g.*, the Darlinghurst hospitals. It is usually the practice in these hospitals for the patient to bring her own obstetric nurse with her, or a special extra staff nurse is engaged by the matron to attend to the patient for the period covering the confinement. Such a patient would be treated in a single ward specially cleansed and prepared for her, and attended by the special nurse.

"(2) Hospitals licensed for about eight (8) beds and over, where the admission of lying-in cases is regular and constitutes a good proportion of all cases received.

"In such hospitals especially in the metropolitan area, I usually find that licensees endeavour to arrange that the accommodation and staff for the obstetric side of the hospital should be separate and kept quite distinct, and apart from the medical and surgical section.

"In hospitals where there are two floors, it is not uncommon to find that the upper floor constitutes the obstetric section, and the ground floor is set aside for medical and surgical cases.

"In both of these types of hospital, there is usually a sterilising room provided. Further, if the reception of lying-in cases is a regular practice of the hospital as in class (2), it is usual to find a room set apart as a labour ward.

"The nurses in such hospitals who are held responsible for the care of patients are certificated trained nurses, presumably well trained in the principles of cleanliness and asepsis.

"(3) Small hospitals of under eight beds, and usually 1–5. This type of hospital is more commonly met with in country towns than in the metropolis, and is often the only hospital available. The hospital conducted by Nurse H—— comes under this category. Her case is similar to numerous others who have been granted such a license as she desires, and for which she is eligible as resident manager, being doubly certificated. At present holding a license for lying-in cases only, she finds that there is not sufficient maternity work to keep her wards fully occupied, and so desires that one ward should be licensed for medical and surgical cases

> "Her experience is not an uncommon one in country towns, owing to the fluctuation in number of patients, and under such conditions the licensee cannot afford the expense of retaining the services of another resident certificated nurse in addition to herself. Frequently the services of a lay helper are secured, who acts as a probationer. I have found, too, that in such applications as this one now under consideration, pressure is usually brought to bear on the nurse by the local medical practitioner to endeavour to arrange that her hospital be licensed for the reception of the three classes of patients. Such an arrangement means that his patients are provided with better facilities for treatment and nursing than in their own homes.
>
> "It has been my experience in connection with similar small private hospitals previously licensed that the occurrence of any untoward event is rare. The manager is usually a trained nurse. She, as a routine measure, thoroughly cleanses and disinfects a room previously used by a medical and surgical case prior to the admission of a lying-in case into it, as well as making provision for fresh linen, &c. However, I have found that nurses to the best of their ability always endeavour to keep rooms classified and separate, according to the class of patients, although sometimes in an emergency the above procedure is necessary.
>
> "I may further state that in my experience of a certificated trained hospital-keeper, she is usually extremely careful as to surgical cleanliness, due to her training and to her regard for the welfare of prospective patients and the reputation of her hospital. In this respect she compares more than favourably with some medical practitioners who visit all kinds of cases on their rounds, and then attend an obstetric case without taking the usual precautions that she does.

"However theoretically desirable separate rooms and separate staff may be for respective classes of patients, it does not seem to be practicable in private hospitals in New South Wales owing to the diverse conditions existing in different parts of the State, nor can it be legally enforced under present regulations. The present requirements insist on an approved resident manager only. I might point out that the Act when framed was primarily intended for the prevention of abortion, hence its apparent deficiencies (according to present day ideas of a private hospital) with regard to regulations and set standards of construction, management and equipment.

. . . .

"I think experience has justified the value of the elasticity of the Act (with its absence of numerous varied regulations) in New South Wales owing to diverse conditions, for which due allowance is made.

"To conclude, it may be assumed that the regulations dealing with the practice of midwifery to be framed under the recent Nurses' Registration Act, will deal with many matters in which the Private Hospitals Act may be possibly deficient in so far as standards of technique, &c., are concerned. . . ."

The Nurses' Registration Act, 1924.—As previously pointed out in my report for the year 1924, this Act amends the Private Hospitals Act by eliminating the definitions of "hospital" and "midwifery" nurses, and the clauses relative to registration of nurses.

This Act on coming into force in January, 1926, will, no doubt, affect the working of private hospitals, and especially in two directions, which are worthy of mention :—

(*a*) For years past it has been the practice of the Board of Health to endeavour to keep the number of uncertificated nurses (to be approved as resident managers of private hospitals) down to a minimum. However, for a period at least this work will possibly be undone, as many of these women hitherto not considered eligible for approval for such positions will now have the opportunity of becoming "registered" nurses under a special concession clause of the Nurses' Registration Act, and if successful will be eligible for approval as resident managers under the Private Hospitals Act.

(*b*) On the other hand, regulations under the Nurses Registration Act should prove to be of value with regard to private hospitals in that certain standards of technique and equipment, hitherto not enforceable under the Private Hospitals Act, will be required of midwifery nurses. No doubt also some supervision of registered nurses will be undertaken, and such might well be co-ordinated with frequent systematic inspection of private hospitals.

Assistance rendered by other Departments.—The thanks of the Department are due to the Commissioner of Police and his officers for their willing and efficient assistance in the administration of the Private Hospitals Act.

Comments on Tables I to III attached.—As indicated in Table I of this report, lying-in hospitals still comprise the largest proportion of licensed premises in the State being 58 per cent. of the total.

Table II.—The number of hospitals containing from 4–10 beds still comprises the largest proportion of licensed premises, and remains about the same as at the close of the previous year, *i.e.*, approximately 47 per cent.

Table III.—Indicates that the number of uncertificated nurses in charge of private hospitals has fallen to a still lower figure than that of last year, although the total number of licensed hospitals has slightly increased.

At the close of the year there were 56 such nurses—metropolitan 1, country 55—as compared with 67 in the year 1924—metropolitan 3, country 64.

F. M. SUCKLING,
Assistant Medical Officer of Health.

Table I.—Showing the Classification of Private Hospitals Licensed at 31st December, 1925, according to Nature of Cases received and the total number of beds provided by each class of hospital.

	Medical, Surgical, and Lying-in.		Medical and Surgical only.		Lying-in.		Total.	
	No. of hospitals.	No of beds.	No. of hospitals.	No of beds.	No. of hospitals.	No. of beds.	No. of hospitals.	No. of beds.
Metropolitan District......	73	1,550	23	435	156	660	252	2,645
Country Districts	142	1,296	17	188	209	811	368	2,295
Total...............	215	2,846	40	623	365	1,471	620	4,940

Table II.—Showing Classification of Private Hospitals with respect to size as signified by Number of Beds available.

	1	2	3	4–5	6–10	11–20	Over 20.	Total.
Metropolitan District......	14	34	33	42	59	38	32	252
Country Districts	19	51	63	71	112	44	8	368
Total...............	33	85	96	113	171	82	40	620

Table III.—Showing Classification of approved persons responsible for the nursing and management of Patients.

	Duly Qualified Medical Practitioners.	Certificated Nurses.	Uncertificated Nurses.	Total.
Metropolitan District.........	3	248	1	252
Country Districts	11	302	55	368
Total..................	14	550	56	620

MEDICO-LEGAL SECTION, &c.; HOSPITAL ADMISSION DEPOT.

REPORT OF THE GOVERNMENT MEDICAL OFFICER FOR SYDNEY FOR THE YEAR ENDED 31ST DECEMBER, 1925.

Medical Staff.

Dr. Arthur Palmer, Government Medical Officer for Sydney; Dr. A. E. Gibbes, Second Government Medical Officer for Sydney; Dr. R. M. Mackay, Third Government Medical Officer, Sydney.

Depot Staff.

Daniel Frazer Heyward, Senior Attendant; William G. Jones, Depot Attendant; William Clarke Escort Attendant.

Sir,

I have the honor to present herewith a brief review of the work carried out by Dr. Gibbes and myself during 1925. A report by Dr. Mackay, in connection with State Insurance and Workmen's Compensation claims, is appended.

Medical Work at Hospital Admission Depot.

Examination of Indigent Sick Persons.—The Government Medical Officers attend at the Hospital Admission Depôt every morning from 9 a.m. to 12·30 p.m. to examine indigent sick persons seeking admission to the various hospitals and institutions. During 1925, 14,991 persons were sent to the State Hospitals and Asylums, or to one or other of the Metropolitan hospitals or convalescent homes. The sick poor who are unable to attend at the depôt are seen at their homes, and arrangements made for their transfer to a suitable institution.

Medical Examinations for Public Services, &c.

Examinations for the Public Service Board.—The Hospital Admission Depôt is utilised for the examination of some of the candidates for admission to the Public Service, and there were 357 examinees under this heading during the year. Other examinations of public servants were in cases of applications for retirement before 60 years through physical incapacity or other medical reasons, and their re-examination each year; or to ascertain the fitness of officers to continue on duty between the age of 60 and 65 years. Special medical examinations are also occasionally required in connection with other Service matters.

Medical Examinations of Police Staff.—553 persons applying for admission to the police force were examined during the year, and 165 probationary constables were re-examined on completion of twelve months' service. Candidates for appointment to this important service are first examined at the Hospital Admission Depôt, and, after twelve months' service, are re-examined at the office of the Inspector-General of Police. At my rooms in the Police Department, members of the police force on the sick list are seen daily, and other matters arising in connection with this service are attended to. During 1925 there was an average daily number of 44 police on sick report as compared with 51 for 1924.

Other Public Services.—Other work for public services included the examination of pilots for the Navigation Department.

Vaccinations.—239 persons were vaccinated at the Hospital Admission Depôt; most of these were members of the police force.

Medical Examinations required by the Factories Act are also made by the Government Medical Officers; there were 3,695 such examinations in 1925.

Examinations for Legal Aid Office.—The work of the Legal Aid Office is carried out at the Hospital Admission Depôt as hitherto, 40 men having been medically examined and their cases dealt with during the past year.

Medico-legal Work.

Cases of alleged Rape and Criminal Assault.—In these cases it is desirable that the persons concerned should be examined with the least possible lapse of time, and urgent calls by the police are frequent at all hours of the day and night in connection with such charges. During 1925, 50 persons were examined in connection with such cases, and there were 27 examinations of clothes and other exhibits in criminal cases.

Suicides, Murders, and Violent or Uncertified Deaths are medico-legal matters which require immediate attention by this Branch. The work for the Coroner's Court in 1925, in connection with such cases, comprised the external examination of 115 dead bodies, the making of 182 internal post-mortem examinations, and the giving of evidence at 100 inquests. In several instances evidence was subsequently given at the Central Criminal Court.

In connection with medico-legal cases, all exhibits of clothing, implements, &c., in cases of murder, rape, and assault, are submitted to this Branch before being sent on to the Microbiological or Chemical Laboratories for examination.

Medical Examination of Accused Persons.—A number of examinations were made of accused persons under the arrangement by which persons charged with capital or other serious offences are medically examined as soon as possible after arrest.

Examinations had also occasionally to be made to ascertain the fitness of prisoners to travel to Long Bay.

Lunacy Cases.—The Reception House at Darlinghurst was visited daily throughout the year for the purpose of examining persons under detention there, and 706 persons (374 males and 332 females) were certified as insane.

In conclusion, it may be added that the medical officers attached to this Branch are on duty at all hours, and are liable to be called upon at any time by any court of law or department of the State Government for work requiring general medical knowledge.

ARTHUR A. PALMER,
Government Medical Officer for Sydney.

ANNUAL REPORT OF THE THIRD GOVERNMENT MEDICAL OFFICER FOR SYDNEY.

(Dr. R. M. Mackay).

I beg to forward the following report of the Medical work performed at the Treasury Insurance Branch for the year ended December, 1925, in connection with Workmen's Compensation and other Accident Claims.

The work done is shown in tabular form, as follows:—

Examinations.		Reviews.	Consultations.	Court attendances.	Examinations for Government Printing Office.
Treasury.	Elsewhere.				
4,497*	24†	2,823‡	51§	2‖	4¶

Explanatory.

* This includes *not* only initial examinations, but re-examinations made during the period of incapacity. The progress of each case is kept under medical observation during the whole period of incapacity.

† Whenever necessary injured workmen are visited at their homes or elsewhere.

‡ The medical history of every claim outside the metropolitan area is reviewed and a period of incapacity certified. Should incapacity appear unduly prolonged a report is obtained from the nearest Government medical officer, and, if necessary, the workman is brought to Sydney for special examination and treatment. The number given, 2,823, does not indicate the amount of correspondence with country doctors which the review of country cases entails.

§ Consultations with specialists have been held in all cases considered necessary and an endeavour made that, should any claim become the subject of litigation, a full medical history, X-ray plates and reports, and report of specialists covering the whole period of incapacity are available.

‖ These have nearly all been on old-standing cases. A number of prospective actions have been abandoned owing to the completeness of our medical evidence. Owing to the searching character of Court proceedings a record of the initial and subsequent medical examinations of the claimant is of the greatest importance. Previous to the appointment of a medical officer to the branch this could not be done in every case. Examination at a later period, under such circumstances, will not give the information of the condition existing soon after the accident.

¶ Visits have been made as requested by the Government Printer for the purpose of medical examination of employees of the Government Printing Office absenting themselves from duty. In all cases these have been made as soon as notified.

R. M. MACKAY,
Third Government Medical Officer.

SECTION I.—B.

Communicable Diseases.

PAGE

1. Notifiable Infectious Diseases recorded in New South Wales during the year ended 31st December, 1925, and Graphs 2

2. Notes on Typhoid fever at Broken Hill (Dr. E. W. Ferguson) 41

3. Venereal Diseases Act, 1918; Fifth Report by the Commissioner (Dr. Robert Dick) for the year ended 31st December, 1925 47

B.—COMMUNICABLE DISEASES.

1.—NOTIFIABLE INFECTIOUS DISEASES RECORDED IN NEW SOUTH WALES DURING THE YEAR ENDED 31ST DECEMBER, 1925.

The Public Health Act, 1902, Part III.

This Act provides that the Governor may, by Proclamation in the *Government Gazette*, declare that any disease therein named is an infectious disease. At the end of 1925 the ordinarily notifiable diseases under the Public Health Act of 1902 were :—

	Notifiable from—	Cases and Deaths Notified.					
		1923.		1924.		1925.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Typhoid fever and paratyphoid	1st January, 1898	873	101	768	97	533	80
Scarlet fever	,,	2,623	13	3,421	29	3,043	27
Diphtheria or membranous croup	,,	3,480	176	4,364	222	3,004	118
Bubonic plague	23rd January, 1900	1	1	...	...	...	...
Infantile paralysis (acute anterior poliomyelitis)	1st February, 1912	104	8	108	6	57	14
Epidemic cerebro-spinal fever (meningococcal meningitis)	11th October, 1915	27	22	29	38	37	27
	Total	7,108	324	8,690	392	6,674	266

The number of cases of the above diseases notified in each district in 1925, deaths therefrom, and age and seasonal incidence are shown in Tables I-VI., pp. 33–40. Pulmonary tuberculosis is notifiable under the Public Health (Amendment) Act, 1915—see below.

The year has been noteworthy for the exceptionally low incidence of typhoid fever and diphtheria; scarlet fever was prevalent throughout the year. There were 57 notified cases of infantile paralysis, compared with 108 in 1924. There was a slight increase in the notifications of epidemic cerebro-spinal fever. Steps are being taken to add encephalitis lethargica to the list of notifiable diseases.

Bubonic Plague.—The State continued free from plague. Systematic rat-trapping was continuous, but no plague-infected animals were found. Detailed statements in regard to bacteriological examinations of rats are given in Part IV, p. 168.

Smallpox.—No case of smallpox was reported in this State during 1925.

Leprosy.—The thirty-fifth Annual Report on Leprosy in New South Wales will be found in Section III (p. 143). At the end of 1925 there were 17 lepers under detention. Medical practitioners attending or becoming aware of cases of leprosy or suspected leprosy are required to notify the cases, in writing, under Part III, Division 2, of the Public Health Act, 1902.

Pulmonary Tuberculosis.—Public Health (Amendment) Act, 1915.

Tuberculosis was made notifiable in the City of Sydney on the 18th October, 1904, under by-laws passed by the Sydney Municipal Council for the purpose. These by-laws required that medical practitioners should notify all cases of pulmonary tuberculosis occurring within the city area seen or attended by them. A return of the cases notified within the City of Sydney from 1st January, 1905, and subsequently under the Public Health (Amendment) Act, 1915, is shown in Table VI (p. 40).

By proclamation under the Public Health (Amendment) Act, 1915, pulmonary tuberculosis was made notifiable in the Metropolitan and Hunter River Combined Sanitary Districts from 11th August, 1915; in the Katoomba Municipality and Blue Mountain Shire from 2nd October, 1916; and in the Blackheath Municipality from 17th December, 1920; at present it is not notifiable elsewhere in the State.

Venereal Diseases Act, 1918.

This Act was passed at the end of 1918; its provisions remained in abeyance until brought into operation by issue of a proclamation on 1st December, 1920. The fifth report of the Commissioner appears on page 47.

TABLE I.—Showing the number of Notified Cases of, and Deaths from, the following diseases:—Cerebro-spinal Fever (Meningococcal Meningitis), Diphtheria and Membranous Croup, Infantile Paralysis (Acute Anterior Poliomyelitis), Scarlet Fever, Typhoid Fever (including Paratyphoid), and Pulmonary Tuberculosis—in the METROPOLITAN COMBINED DISTRICTS for the year ended 31st December, 1925.

District.	Typhoid Fever and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary Tuberculosis.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
METROPOLITAN MUNICIPALITIES.												
Sydney (City of)	15	13	113	...	142	33	4	4	2	1	138	85
Alexandria	2	...	14	...	20	...	...	...	...	...	6	1
Annandale	1	...	17	...	17	...	1	...	...	...	17	9
Ashfield	4	...	69	...	35	...	1	1	...	...	29	11
Balmain	3	...	20	...	29	2	2	1	...	...	31	4
Bexley	3	...	55	...	21	...	...	...	...	...	5	4
Botany	1	...	15	...	30	1	1	...	...	...	5	...
Burwood	1	...	53	...	20	...	1	...	...	...	15	7
Canterbury	8	...	155	...	67	1	3	...	1	...	43	11
Concord	4	...	27	1	29	...	...	...	...	...	10	4
Darlington	...	...	6	...	2	...	...	...	...	...	3	...
Drummoyne	2	...	26	...	24	...	...	...	...	...	21	2
Eastwood	...	...	1	...	5	...	...	...	...	...	2	1
Enfield	1	...	46	...	33	...	1	...	...	...	5	2
Erskineville	2	...	13	...	11	...	...	...	...	...	8	...
Glebe	5	1	30	...	32	1	1	...	...	...	17	5
Homebush	1	...	9	...	1	...	...	...	...	...	1	...
Hunter's Hill	6	1	10	...	9	...	...	...	...	...	7	3
Hurstville	3	...	44	...	33	...	1	...	...	...	11	3
Kogarah	2	2	106	...	58	1	1	...	...	2	22	8
Lane Cove	2	...	27	...	25	...	...	...	...	...	12	2
Leichhardt	3	...	35	...	50	...	2	...	...	...	26	9
Manly	4	...	9	...	19	...	3	...	...	...	4	6
Marrickville	20	2	97	...	55	...	1	...	...	...	21	13
Mascot	3	...	13	...	32	...	...	...	...	1	6	1
Mosman	3	...	17	...	9	...	1	...	...	1	13	1
Newtown	2	...	44	...	43	...	...	...	...	...	19	6
North Sydney	9	5	59	...	58	...	1	...	2	...	33	17
Paddington	5	...	36	...	70	...	5	...	...	...	30	9
Petersham	4	...	41	...	27	1	3	...	1	...	24	8
Randwick	21	4	94	13	89	8	...	...	1	1	144	81
Redfern	5	...	36	...	28	...	1	...	1	...	19	6
Rockdale	6	1	76	...	51	...	...	...	...	...	13	7
Ryde	...	...	43	...	34	...	...	...	...	...	19	5
St. Peters	2	...	26	...	21	...	...	...	1	...	8	5
Strathfield	...	...	26	...	10	...	...	...	...	...	8	1
Vaucluse	2	...	3	...	8	...	...	...	...	...	...	...
Waterloo	1	1	22	...	25	...	1	...	2	1	13	6
Waverley	9	...	76	...	50	...	2	...	...	...	24	8
Willoughby	12	2	46	...	63	12	1	...	1	2	26	17
Woollahra	1	...	32	...	25	1	...	...	...	...	18	6
Shire of Ku-ring-gai	9	...	17	...	18	...	...	...	1	1	20	15
EXTRA-METROPOLITAN MUNICIPALITIES.												
Auburn	4	1	61	...	27	...	...	...	1	...	10	10
Bankstown	2	...	15	...	19	...	1	...	1	...	5	5
Cabramatta and Canley Vale	...	...	2	...	...	...	...	...	...	...	...	1
Dundas	...	...	11	...	13	...	...	...	...	...	2	...
Ermington and Rydalmere	1	...	...	...	...	...	...	...	...	...	2	...
Fairfield	...	...	17	...	6	...	...	...	...	...	10	11
Granville	13	...	27	...	12	...	...	...	...	...	6	2
Ingleburn	...	...	1	...	2	...	...	...	...	...	...	1
Lidcombe	2	...	31	...	20	...	...	...	...	...	69	68
Liverpool	1	...	3	...	3	...	1	...	...	...	14	3
Parramatta	7	...	24	...	26	...	...	...	...	...	9	12
Prospect and Sherwood	2	...	21	...	9	...	1	...	...	...	2	2
SHIRES.												
Hornsby	3	...	18	...	22	...	...	...	1	...	22	26
Warringah	1	...	8	...	21	...	...	...	...	...	3	3
Harbour of Port Jackson	...	...	...	...	...	...	...	...	...	...	1	...
Totals	223	33	1,944	14	1,608	61	41	6	16	10	1,051	533

TABLE II.—Showing the number of Notified Cases of, and Deaths from, Cerebro-spinal Fever (Meningococcal Meningitis), Diphtheria or Membranous Croup, Infantile Paralysis (Acute Anterior Poliomyelitis), Scarlet Fever, Typhoid Fever, including Paratyphoid, and Pulmonary Tuberculosis, in the HUNTER RIVER COMBINED DISTRICT, for the year ended 31st December, 1925.

District.	Typhoid and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary Tuberculosis.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
MUNICIPALITIES.												
Adamstown	...	...	12	...	16	...	...	...	...	...	3	1
Carrington	1	...	3	...	2	...	...	...	...	...	1	1
Greta	...	...	...	...	...	...	...	...	...	...	...	...
Hamilton	4	...	16	...	30	...	...	...	...	...	5	2
Lambton	2	...	5	...	4	...	...	...	...	...	1	2
Maitland, East	4	...	1	...	6	...	...	...	...	...	2	1
Maitland, West	2	2	13	...	12	4	...	...	...	...	6	6
Merewether	6	...	4	...	15	...	...	...	...	...	2	3
Morpeth	5	...	4	...	4	...	...	...	...	...	...	...
Newcastle	2	1	11	...	20	3	...	...	...	...	14	10
New Lambton	...	...	10	...	15	...	...	...	...	...	2	1
Raymond Terrace	...	...	1	...	...	...	...	...	...	...	1	...
Singleton	4	1	1	...	...	...	...	...	...	...	1	1
Stockton	3	...	10	...	11	...	...	...	...	...	...	1
Wallsend	3	2	6	...	2	5	...	...	...	1	...	...
Waratah	8	...	24	...	16	...	...	...	1	...	4	6
Wickham	1	...	8	...	10	...	...	...	...	...	6	3
SHIRES.												
Bolwarra	1	...	7	...	4	...	...	...	...	...	...	...
Cessnock	1	...	62	1	81	...	2	...	...	...	4	6
Lake Macquarie	6	...	24	1	35	1	1	...	...	...	8	3
Port Stephens	...	...	4	...	2	...	...	...	...	...	...	...
Tarro	...	...	8	...	8	1	...	...	1	1	1	1
Harbour of Port Hunter	...	...	1	...	...	...	...	...	...	...	...	...
Total	53	6	235	2	293	14	3	...	2	2	61	48

TABLE III.—Showing the number of Notified Cases of, and Deaths from, Cerebro-spinal Fever (Meningococcal Meningitis), Diphtheria or Membranous Croup, Infantile Paralysis (Acute Anterior Poliomyelitis), Scarlet Fever, Typhoid Fever, including Paratyphoid, and Pulmonary Tuberculosis, in the REMAINDER OF STATE, for the year ended 31st December, 1925.

District.	Typhoid and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary* Tuberculosis.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
MUNICIPALITIES.												
Aberdeen	...	...	...	...	1	...	1	...	...	...	...	...
Albury	3	...	15	...	29	2	...	...	...	...	...	6
Armidale	2	...	29	...	12	1	...	...	...	...	...	5
Ballina	...	...	4	...	4	...	...	...	...	...	...	1
Balranald	...	...	8	...	...	...	...	...	...	...	...	...
Barraba	...	...	1	...	...	...	...	...	...	...	...	...
Bathurst	2	...	10	...	3	...	...	...	1	2	...	4
Bega	...	...	...	...	3	...	...	...	...	...	...	...
Berry	...	...	...	...	...	...	...	...	...	...	...	1
Bingara	...	...	...	...	...	...	...	...	...	...	...	...
Blackheath	...	...	3	...	...	...	...	...	...	...	5	1
Blayney	...	...	4	...	2	...	...	...	...	...	...	...
Bombala	...	...	5	...	...	...	...	1	...	...	...	...
Bourke	3	1	1	...	...	1	...	...	...	...	...	1
Bowral	...	...	6	...	...	...	...	...	...	...	...	4
Braidwood	...	...	...	...	...	...	...	...	...	...	...	1
Brewarrina	...	...	3	...	...	...	...	...	...	...	...	1
Broken Hill	80	10	9	...	24	...	...	1	...	...	...	25
Broughton Vale	...	...	...	...	...	...	...	...	...	...	...	...
Burrowa	1	...	3	...	3	1	...	...	...	...	...	2
Camden	2	1	4	1	1	...	...	...	...	...	...	3
Campbelltown	1	...	8	...	...	...	...	...	...	...	...	...
Carcoar	...	...	...	...	...	...	...	...	...	...	...	...
Casino	1	...	...	...	1	...	...	...	...	...	...	2
Castlereagh	...	...	1	...	...	...	...	...	...	...	...	...
Cobar	1	...	...	...	...	...	...	...	...	...	...	...
Condobolin	1	1	...	...	1	...	...	...	...	...	...	4
Cooma	...	2	1	...	...	1	...	...	...	...	...	...
Coonamble	...	...	...	...	13	...	...	...	...	...	...	...
Cootamundra	...	...	13	...	5	...	...	...	...	...	...	2
Coraki	1	...	1	...	6	1	...	...	...	...	...	...
Corowa	...	1	...	...	26	1	...	...	1	2	...	1
Cowra	...	...	2	...	50	...	...	...	...	...	...	...
Cudal	...	...	...	...	...	...	...	...	...	...	...	...
Deniliquin	11	2	3	...	4	...	...	...	1	1	...	2
Dubbo	...	...	12	...	30	2	...	...	...	...	...	4

* Notifiable only in the Blackheath and Katoomba Municipalities and Blue Mountain Shire.

REMAINDER OF STATE.—Return showing the number of Cases, &c., from Country Municipalities—*continued.*

District.	Typhoid and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary* Tuberculosis.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
MUNICIPALITIES.—*continued.*												
Dungog	1	...	5	...	3	...	...	...	...	...	...	1
Forbes	6	3	11	...	2	...	...	...	...	...	...	5
Gerringong	...	...	...	...	...	...	...	...	...	...	...	...
Glen Innes	3	...	4	...	22	1	...	...	...	1	...	4
Goulburn	3	1	63	2	24	...	...	1	...	1	...	2
Grafton	4	1	15	1	5	...	...	...	...	...	...	3
Grafton, South	...	...	...	...	2	...	...	...	...	...	...	...
Grenfell	...	...	...	...	...	...	...	...	...	...	...	...
Gulgong	...	...	...	...	...	...	1	1	...	...	...	2
Gundagai	...	...	...	...	...	...	...	...	...	...	...	...
Gunnedah	...	...	6	...	5	...	...	...	...	...	...	2
Hay	1	...	...	...	7	1	...	...	...	...	...	...
Hillgrove	...	...	...	...	...	...	...	...	...	...	...	...
Hillston	...	...	...	...	...	...	...	...	...	...	...	...
Illawarra, Central	1	...	7	...	7	...	...	...	...	...	...	...
Illawarra, North	...	...	22	...	7	...	...	...	...	...	...	1
Inverell	1	2	4	...	7	...	...	...	...	...	...	1
Jamberoo	...	...	...	...	...	...	...	...	...	...	...	...
Junee	...	...	7	1	27	...	2	...	...	...	...	2
Katoomba	1	1	3	...	1	...	...	...	...	...	12	18
Kempsey	...	1	5	1	9	2	...	...	...	...	...	1
Kiama	...	...	...	...	1	...	...	...	...	...	...	...
Lismore	...	...	6	...	3	...	...	...	...	...	...	·2
Lithgow	9	2	...	...	21	2	...	...	...	...	...	3
Maclean	...	1	1	...	6	...	...	...	...	...	...	...
Manilla	...	...	...	...	...	...	...	...	...	...	...	...
Mittagong	...	...	1	...	2	...	...	...	1	...	...	...
Moama	...	...	...	...	...	...	...	...	...	...	...	...
Molong	...	...	3	...	3	1	...	...	...	...	...	...
Moss Vale	...	...	...	...	...	...	...	...	...	...	...	1
Moree	...	...	8	...	8	1	...	...	2	3	...	1
Moruya	...	...	...	...	...	...	...	...	...	...	...	...
Mudgee	...	...	8	...	2	...	...	...	...	...	...	1
Mulgoa	...	...	...	...	...	...	...	...	...	...	...	...
Mullumbimby	...	...	...	...	...	...	...	...	...	...	...	...
Murrumburrah	...	...	13	...	1	...	...	...	...	...	...	...
Murrurundi	1	...	6	...	...	...	...	...	...	...	...	...
Murwillumbah	...	...	...	...	9	1	...	...	...	...	...	3
Muswellbrook	4	...	5	...	2	...	...	...	...	...	...	...
Narrabri	...	...	2	...	3	...	...	2	1	...	...	2
Narrabri, West	...	...	...	...	1	...	...	1	...	...	...	...
Narrandera	...	...	21	...	11	...	...	...	...	...	...	1
Narromine	...	...	5	...	1	...	...	...	...	...	...	1
Nowra	...	...	1	...	...	...	...	...	...	...	...	...
Nyngan	...	...	5	1	7	1	...	...	...	...	...	2
Orange	2	2	17	...	5	...	...	...	...	1	...	4
Orange, East	...	...	...	...	...	...	...	...	...	...	...	...
Parkes	5	...	2	...	11	2	...	...	...	...	...	2
Peak Hill	1	...	2	...	1	...	...	...	...	...	...	...
Penrith	...	...	9	...	5	...	...	...	...	...	...	5
Picton	...	...	...	...	2	...	...	...	...	...	...	1
Port Macquarie	...	...	...	...	...	...	...	...	...	...	...	...
Queanbeyan	1	...	13	...	1	...	...	...	1	...	...	1
Quirindi	1	...	1	...	1	1	...	...	...	...	...	1
Richmond	...	...	6	...	...	...	...	...	...	...	...	1
Scone	...	...	1	...	5	...	...	...	...	...	...	2
Shellharbour	...	...	1	...	...	...	...	...	...	...	...	...
Shoalhaven, South	...	...	...	...	...	...	...	...	...	...	...	...
St. Mary's	1	...	2	...	...	...	...	...	...	...	...	...
Tamworth	7	2	3	...	14	1	...	...	...	...	...	6
Taree	...	...	2	...	3	...	...	...	...	...	...	3
Temora	3	3	15	...	19	...	...	...	...	...	...	3
Tenterfield	...	...	3	...	6	...	...	...	...	...	...	...
Tumut	2	...	...	...	1	...	...	...	...	...	...	...
Ulladulla	1	...	...	...	...	...	2	...	...	...	...	...
Ulmarra	...	...	6	...	7	...	...	...	...	...	...	...
Uralla	...	...	4	...	1	...	...	...	...	...	...	...
Wagga	1	...	20	...	18	1	...	...	...	...	...	4
Walcha	...	...	...	...	...	...	...	...	...	...	...	...
Wallendbeen	...	...	...	...	...	...	...	...	...	...	...	...
Warialda	...	...	...	...	...	...	...	...	...	...	...	...
Warren	...	...	2	...	5	...	...	...	...	1	...	1
Wellington	1	...	7	...	15	...	...	...	...	...	...	5
Wentworth	...	...	...	...	1	...	...	...	...	...	...	1
Wilcannia	...	...	1	...	...	...	...	...	...	...	...	1
Windsor	...	...	9	1	2	1	...	...	...	...	...	...
Wingham	...	...	...	...	...	...	...	...	...	...	...	...
Wollongong	3	...	14	...	3	1	...	...	...	...	...	1
Wyalong	...	...	...	...	...	...	...	...	...	...	...	...
Yass	1	1	1	...	...	...	...	...	...	...	...	1
Young	...	...	2	...	11	...	...	...	...	...	...	3
Total, Municipalities	174	38	526	8	564	27	6	7	8	12	17	175

* Notifiable only in the Blackheath and Katoomba Municipalities and Blue Mountain Shire.

REMAINDER OF STATE.—Return showing the number of Cases, &c., from Country Shires.

Shires.	Typhoid and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary * Tuberculosis	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
2. SHIRES.												
Abercrombie	...	...	8	...	...	...	...	...	...	...	...	2
Amaroo	1	...	...	...	6	...	...	...	...	...	...	1
Apsley	...	...	...	...	...	...	...	...	...	...	...	...
Ashford	1	...	2	...	1	...	...	...	...	...	...	...
Bannockburn	...	...	...	...	2	...	...	...	...	...	...	...
Barraba	...	...	...	...	...	...	...	...	...	...	...	...
Baulkham Hills	6	...	1	...	3	...	...	...	...	...	...	1
Bellingen	5	...	1	...	10	1	...	...	...	...	...	2
Berrigan	...	...	2	...	10	...	...	...	...	...	...	2
Bibbenluke	1	...	1	...	...	...	...	...	...	...	...	2
Blacktown	...	...	9	...	8	...	...	...	1	...	...	4
Bland	2	...	15	...	9	...	...	...	...	...	...	1
Blaxland	...	...	10	...	7	...	...	...	...	...	...	1
Blue Mountains	3	...	6	...	5	...	...	...	...	...	66	17
Bogan	...	...	1	...	...	...	...	...	...	...	...	...
Boolooroo	...	...	1	...	...	...	...	...	1	...	...	...
Boomi	1	...	...	...	2	...	...	...	...	...	...	...
Boree	1	...	...	...	5	...	...	...	...	...	...	1
Bulli	3	1	22	1	15	1	...	...	...	...	...	160
Burrangong	...	...	1	...	6	...	...	...	...	...	...	1
Byron	...	...	1	...	...	...	...	...	...	...	...	...
Cambewarra	...	...	...	...	...	...	...	...	...	...	...	...
Canoblas	...	...	3	...	1	...	...	...	...	...	...	...
Carrathool	...	...	3	...	5	...	...	...	...	...	...	...
Clyde	...	...	...	...	1	...	...	...	...	...	...	1
Cobborah	3	...	2	...	3	...	...	...	...	...	...	1
Cockburn	2	...	1	...	5	...	...	...	...	...	...	...
Colo	...	...	6	...	...	...	...	...	...	...	...	2
Conargo	...	...	...	...	...	...	...	...	...	...	...	1
Coolah	...	...	...	...	1	...	...	...	...	...	...	...
Coolamon	5	...	5	...	9	...	...	...	...	...	...	1
Coonabarabran	1	1	...	...	2	...	...	...	...	...	...	...
Copmanhurst	...	...	2	...	2	...	...	...	...	...	...	2
Coreen	1	1	...	...	11	...	...	...	...	...	...	1
Crookwell	1	...	5	...	5	...	...	...	...	...	...	3
Cudgegong	...	...	1	...	...	...	...	...	...	...	...	1
Culcairn	2	...	7	...	13	1	...	...	...	...	...	...
Dalgety	1	...	...	...	1	...	...	...	...	...	...	...
Demondrille	...	...	4	...	2	...	...	...	...	...	...	...
Dorrigo	3	...	2	...	3	2	...	...	...	1	...	...
Dumaresq	1	...	8	...	2	...	...	...	...	...	...	...
Erina	3	...	10	...	8	1	1	...	...	...	...	2
Eurobodalla	...	...	...	...	3	...	...	...	...	...	...	...
Gadara	1	...	1	...	6	...	...	...	...	...	...	1
Gilgandra	...	...	...	...	53	2	...	...	...	...	...	...
Gloucester	...	...	1	...	1	...	...	...	...	...	...	...
Goobang	...	...	3	...	...	...	...	...	...	...	...	1
Goodradigbee	...	...	1	...	5	...	...	...	...	...	...	2
Gostwyck	...	...	1	...	3	...	...	...	...	...	...	...
Gundagai	...	...	...	...	4	...	...	...	...	...	...	2
Gundurimba	1	...	3	...	2	...	...	...	...	...	...	...
Gunning	...	...	6	...	4	...	...	...	...	...	...	1
Guyra	...	...	7	...	2	...	...	...	...	...	...	1
Gwydir	...	...	...	...	...	...	...	...	...	...	...	...
Harwood	2	...	2	...	3	...	...	...	...	...	...	...
Hastings	...	...	2	...	2	...	...	...	...	...	...	1
Holbrook	...	...	3	...	17	...	...	...	...	...	...	...
Hume	...	...	2	...	3	...	...	...	...	...	...	...
Illabo	...	...	3	...	7	...	1	...	...	...	...	...
Imlay	...	...	...	...	...	...	...	...	...	...	...	...
Jemalong	...	...	5	...	...	...	...	...	...	...	...	...
Jerilderie	...	...	1	...	...	...	...	...	...	...	...	
Jindalee	...	...	2	...	...	...	...	...	...	...	...	
Kyeamba	1	...	1	1	2	...	...	...	...	...	...	...
Kyogle	...	...	5	...	4	...	...	...	...	...	...	
Lachlan	1	...	...	...	...	...	...	...	1	...	...	...
Liverpool Plains	...	...	...	...	5	...	...	...	...	...	...	..
Lockhart	...	...	...	...	7	1	...	...	...	...	...	...
Lyndhurst	...	...	1	...	1	...	...	...	...	...	...	...
McIntyre	1	...	1	...	4	...	...	...	...	...	...	1
Macleay	1	...	2	...	8	...	...	...	...	...	...	2
Macquarie	...	...	5	...	6	...	...	...	...	...	...	...
Mandowa	...	...	1	...	3	...	...	...	...	...	...	...
Manning	...	...	...	...	3	...	...	...	1	...	...	1
Marthaguy	...	...	1	...	1	...	...	...	...	...	...	...
Merriwa	...	...	...	...	...	...	...	...	...	...	...	...
Mitchell	...	...	1	...	5	...	...	...	...	...	...	2
Monaro	2	...	...	...	1	...	...	...	...	...	...	...
Mulwarree	1	...	13	...	3	1	...	...	...	...	...	3

* Notifiable only in the Blue Mountain Shire

REMAINDER OF STATE.—Return showing the number of Cases, &c., from Country Shires—*continued.*

Shire.	Typhoid and Paratyphoid.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary * Tuberculosis.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
SHIRES—*continued.*												
Mumbulla	...	...	2	...	5	...	...	...	...	...	...	2
Murray	...	...	...	...	...	...	...	...	...	...	...	...
Murrumbidgee	...	...	...	1	1	2	...	...	...	2	...	4
Murrungal	...	...	7	...	3	...	...	...	...	...	...	...
Muswellbrook	...	...	2	...	2	...	...	...	...	...	...	1
Nambucca	...	...	2	...	4	...	...	...	...	...	...	1
Namoi	1	...	3	...	3	...	1	1	...	...	...	2
Narraburra	2	...	4	...	9	...	...	...	...	...	...	...
Nattai	...	...	...	...	...	...	...	...	...	...	...	2
Nepean	...	...	4	...	...	...	...	...	...	...	...	3
Nundle	...	...	...	...	...	...	...	...	...	...	...	...
Nymboida	...	...	...	...	...	...	...	...	...	...	...	...
Oberon	...	...	5	...	2	1	...	...	...	...	...	1
Orara	...	...	...	...	...	...	...	...	...	...	...	...
Patrick's Plains	2	...	2	...	1	...	1	...	...	...	...	3
Peel	1	...	...	...	16	...	...	...	...	...	...	...
Rylstone	1	...	1	...	...	...	...	...	...	...	...	...
Severn	...	...	...	...	10	...	1	...	1	...	...	1
Stroud	1	...	1	...	12	...	...	...	...	...	...	...
Sutherland	2	...	27	...	17	...	...	...	...	...	...	3
Talbragar	1	...	2	...	14	...	...	...	...	...	...	...
Tallaganda	...	...	2	...	2	...	1	...	...	...	...	...
Tamarang	1	...	1	...	4	...	...	...	...	...	...	...
Tenterfield	...	...	1	...	3	...	...	...	1	...	...	...
Terania	...	...	2	...	...	...	...	...	...	...	...	1
Timbrebongie	1	...	5	...	6	...	...	...	...	...	...	1
Tintenbar	...	...	4	...	...	...	...	...	...	...	...	1
Tomki	...	...	...	...	...	...	...	...	...	...	...	...
Tumbarumba	2	...	...	...	...	...	...	...	...	...	...	...
Turon	...	...	1	...	...	...	...	...	...	...	...	...
Tweed	...	...	...	...	4	...	1	...	...	...	...	...
Upper Hunter	1	...	...	...	4	...	...	...	...	...	...	...
Urana	1	...	...	...	1	...	...	...	...	...	...	2
Wakool	...	...	3	...	2	...	...	...	...	...	...	...
Walgett	...	...	1	...	1	...	...	...	1	...	...	1
Wallarobba	...	...	6	...	4	...	...	...	...	...	...	2
Waradgery	1	...	...	...	...	...	...	...	...	...	...	...
Warrah	...	...	4	...	1	...	...	...	...	...	...	1
Waugoola	2	...	4	...	19	1	...	...	...	...	...	...
Weddin	...	...	...	...	...	...	...	...	...	...	...	2
Windouran	...	...	...	...	...	...	...	...	...	...	...	...
Wingadee	...	...	...	...	8	...	...	...	...	...	...	...
Wingecarribee	...	...	3	...	2	...	...	...	...	...	...	...
Wollondilly	1	...	4	...	...	...	...	...	...	...	...	2
Woodburn	...	...	...	...	...	...	...	...	...	...	...	...
Wyaldra	...	...	3	...	...	...	...	...	...	...	...	...
Yallaroi	...	...	1	...	2	1	...	...	...	...	...	1
Yanko	1	...	17	...	36	...	...	...	4	...	...	...
Yarrowlumla	...	...	...	...	1	1	...	...	...	...	...	...
Total	80	3	338	3	530	16	7	1	11	3	66	266
COUNTRY POLICE DISTRICTS.												
Balranald	...	...	...	...	...	...	...	...	...	...	...	...
Bourke	...	...	...	...	1	...	...	...	...	...	...	...
Brewarrina	...	...	...	...	...	...	...	...	...	...	...	...
Broken Hill	1	...	...	...	2	...	...	...	...	...	...	...
Cobar	...	...	...	...	...	...	...	...	...	...	...	...
Hay	...	...	...	...	...	...	...	...	...	...	...	...
Hillston	...	...	...	...	...	...	...	...	...	...	...	...
Menindie	...	...	...	...	...	...	...	...	...	...	...	...
Mitchell	2	...	...	...	6	...	...	...	...	...	...	...
Walgett	...	...	...	...	...	...	...	...	...	...	...	...
Wentworth	...	...	...	...	...	...	...	...	...	...	...	...
Wilcannia	...	...	...	...	...	...	...	...	...	...	...	...
Total	3	...	...	...	9	...	...	...	...	...	...	...
Outside the State—												
Queensland	...	...	...	...	...	...	...	...	...	...	...	...
Victoria	2	...	16	...	15	...	...	...	...	...	...	...
South Australia	...	...	...	...	...	...	...	...	...	...	...	...
Total	2	...	16	...	15	...	...	...	...	...	...	...

* Notifiable only in the Blue Mountain Shire.

TABLE IV.—Table showing Age and Sex Incidence, and Mortality, in the Metropolitan Combined District, Hunter River Combined District, and Remainder of State, from the notified cases of Cerebro-spinal Fever (Meningococcal Meningitis), Diphtheria and Membranous Croup, Infantile Paralysis (Acute Anterior Poliomyelitis), Scarlet Fever, Typhoid Fever (including Paratyphoid), and Pulmonary Tuberculosis, for the year ended 31st December, 1925.

Age Period.	Typhoid and Paratyphoid.						Scarlet Fever.						Diphtheria.						Infantile Paralysis.						Cerebro-spinal Meningitis.						Pulmonary Tuberculosis.					
	Incidence.			Mortality.			Incidence.			Mortality.			Incidence.			Mortality.			Incidence.			Mortality.			Incidence.			Mortality.			Incidence.			Mortality.		
	Notified cases.			Notified deaths.			Notified cases.			Notified deaths.			Notified cases.			Notified deaths.			Notified cases.			Notified deaths.			Notified cases.			Notified deaths.			Notified cases.			Notified deaths.		
	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total	M.	F.	Total.
METROPOLITAN COMBINED DISTRICT.																																				
All ages	121	102	223	24	9	33	716	1,228	1,944	5	9	14	739	869	1,608	36	25	61	23	18	41	6	...	6	11	5	16	7	3	10	653	398	1,051	323	210	533
Under 1 year	...	...	...	...	...	...	6	4	10	...	2	2	19	11	30	6	6	12	2	1	3	...	...	...	2	...	2	1	1	1	...	2	2	...	...	...
1— 4	5	3	8	...	1	1	174	186	360	3	2	5	313	309	622	28	13	41	14	10	24	3	...	3	2	...	2	2	...	2	3	1	4	...	1	1
5—14	27	31	58	2	...	2	418	755	1,173	...	3	3	320	365	685	1	6	7	7	4	11	2	...	2	5	2	7	2	2	4	10	19	29	1	3	4
15—24	39	23	62	5	2	7	62	141	203	...	...	...	43	87	130	...	...	...	...	3	3	...	...	...	...	2	2	...	...	...	69	103	172	15	44	59
25—34	15	22	37	8	2	10	29	110	139	1	1	2	21	54	75	...	...	...	...	...	...	...	...	...	1	1	2	1	...	1	125	118	243	74	61	135
35—44	19	13	32	6	3	9	21	19	40	1	1	2	14	29	43	1	...	1	...	...	...	1	...	1	...	...	...	...	...	...	146	80	226	82	40	122
45—54	13	6	19	3	...	3	5	2	7	...	...	...	4	3	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	95	39	134	60	26	86
55—64	3	3	6	...	1	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	59	23	82	54	9	63
65 and over	...	1	1	...	...	...	...	2	2	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	31	6	37	36	26	62
Age not stated	...	...	...	...	...	...	1	9	10	...	...	...	5	9	14	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	115	7	122	...	...	...
HUNTER RIVER COMBINED DISTRICT.																																				
All ages	24	29	53	4	2	6	74	161	235	...	2	2	149	144	293	7	7	14	1	2	3	...	...	...	1	1	2	1	1	2	34	27	61	28	20	48
Under 1 year	...	...	...	...	...	...	...	1	1	...	...	...	2	7	9	1	1	2	...	...	...	...	...	...	1	...	1	1	...	1	...	...	...	...	...	...
1— 4	1	...	1	1	...	1	14	26	40	...	2	2	74	49	123	6	3	9	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5—14	5	6	11	1	...	1	53	98	151	...	...	...	53	50	103	...	3	3	...	1	1	...	...	...	...	...	...	...	...	...	...	2	2	...	1	1
15—24	13	8	21	...	...	...	5	25	30	...	...	...	14	22	36	...	...	...	...	...	...	...	...	...	...	1	1	...	1	1	1	8	9	2	6	8
25—34	2	6	8	...	...	...	2	7	9	...	...	...	3	8	11	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7	4	11	6	5	11
35—44	3	5	8	2	1	3	...	2	2	...	...	...	2	5	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	6	15	6	3	9
45—54	...	4	4	...	1	1	...	2	2	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	2	8	7	2	9
55—64	...	...	...	...	...	...	...	...	...	...	...	...	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8	3	11	5	1	6
65 and over	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	5	2	2	4
Age not stated	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
REMAINDER OF STATE.																																				
All ages	162	95	257	30	11	41	272	592	864	4	7	11	482	621	1,103	18	25	43	5	8	13	3	5	8	16	3	19	10	5	15	64	19	83*	262	179	441
Under 1 year	1	...	1	...	...	...	2	4	6	...	...	...	12	8	20	4	2	6	...	2	2	...	1	1	2	...	2	2	1	3	...	...	...	...	2	2
1— 4	5	4	9	...	3	3	63	98	161	2	5	7	170	127	297	8	18	26	5	4	9	2	3	5	5	1	6	3	...	3	...	...	...	...	1	1
5—14	37	37	74	2	2	4	156	341	497	2	...	2	186	280	466	5	4	9	...	2	2	1	...	1	5	...	5	2	1	3	...	...	...	3	2	5
15—24	43	21	64	5	5	10	39	76	115	...	1	1	60	111	171	...	1	1	...	...	...	...	...	...	2	1	3	1	2	3	1	7	8	15	36	51
25—34	33	11	44	6	1	7		45	49	...	1	1	31	48	79	...	...	...	...	...	...	...	...	...	1	...	1	...	1	1	25	7	32	50	57	107
35—44	23	10	33	10	...	10	6	17	23	...	...	...	11	29	40	1	...	1	...	...	...	...	...	...	...	1	1	1	...	1	25	4	29	77	32	109
45—54	11	9	20	5	...	5	...	3	3	...	...	...	4	8	12	...	...	...	...	...	...	...	1	1	1	...	1	1	...	1	9	...	9	49	24	73
55—64	5	1	6	2	...	2	1	...	1	...	...	...	1	3	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	1	4	47	11	58
65 and over	1	1	2	...	...	...	...	...	...	...	...	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21	14	35
Age not stated	3	1	4	...	...	...	1	8	9	...	...	...	5	7	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...

SUMMARY.

District.	Typhoid Fever.		Scarlet Fever.		Diphtheria.		Infantile Paralysis.		Cerebro-spinal Meningitis.		Pulmonary Tuberculosis	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
Metropolitan Combined Sanitary District	223	33	1,944	14	1,608	61	41	6	10	10	1,051	533
Hunter River Combined Sanitary District	53	6	235	2	293	14	3	...	2	2	61	48
Remainder of State—												
Municipalities	174	38	526	8	564	27	6	7	8	12	17	175
Shires	80	3	338	3	530	16	7	1	11	3	66	266
Police Districts	3	...	...	...	9	...	...	...	...	...	...	...
Total	533	80	3,043	27	3,004	118	57	14	37	27	1,195	1,022

* Notifiable only in Blackheath and Katoomba Municipalities and Blue Mountain Shire.

TABLE V.—Showing the seasonal prevalence of Cerebro-spinal Fever (Meningococcal Meningitis), Diphtheria and Membranous Croup, Infantile Paralysis (Acute Anterior Poliomyelitis), Scarlet Fever, Typhoid Fever (including Paratyphoid), and Pulmonary Tuberculosis, in New South Wales for the year ended 31st December, 1925.

Month, 1925.	Typhoid Fever and Paratyphoid.								Scarlet Fever.								Diphtheria.							
	Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.		Total.		Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.		Total.		Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.		Total.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
January.......	14	3	6	1	21	4	41	8	105	...	7	...	66	3	178	3	134	5	11	1	74	...	219	6
February ...	24	3	5	1	26	7	55	11	97	...	4	1	66	1	167	2	119	5	21	1	71	2	211	8
March.........	25	4	5	1	42	4	72	9	147	1	25	...	131	...	303	1	185	4	24	...	148	2	357	6
April	15	...	7	...	47	8	69	8	164	2	32	...	88	1	284	3	141	6	20	3	123	8	284	17
May	14	1	4	...	33	3	51	4	179	...	26	...	91	...	296	...	172	6	34	1	126	5	332	12
June	24	1	3	...	20	2	47	3	182	1	29	...	86	1	297	2	166	10	37	1	136	8	339	19
July	25	2	2	...	13	2	40	4	196	4	12	...	69	2	277	6	176	7	30	...	84	4	290	11
August	12	3	...	...	6	...	18	3	164	2	20	...	60	1	244	3	138	5	25	2	73	3	236	10
September...	12	4	1	...	5	...	18	4	162	...	17	...	59	1	238	1	111	3	24	2	67	3	202	8
October	19	3	3	...	4	...	26	3	194	2	16	...	57	1	267	3	92	5	25	2	73	5	190	12
November ...	14	4	6	...	18	5	38	9	179	1	23	1	50	...	252	2	94	3	22	1	59	...	175	4
December ...	25	5	11	3	22	6	58	14	175	1	24	...	41	...	240	1	80	2	20	...	69	3	169	5
Totals......	223	33	53	6	257	41	533	80	1,944	14	235	2	864	— 11	3,043	27	1,608	61	293	14	1,103	43	3,004	118

Month, 1925.	Infantile Paralysis.								Cerebro-spinal Meningitis.								Pulmonary Tuberculosis.							
	Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.		Total.		Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.		Total.		Metropolitan Combined Districts.		Hunter River Combined Districts.		Remainder of State.*		Total.	
	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.
January.......	2	1	...	...	...	2	2	3	1	1	1	1	1	1	3	3	116	38	5	4	6	31	127	73
February ...	...	...	...	...	4	2	4	2	...	...	...	...	3	2	3	2	108	36	7	4	4	36	119	76
March.........	1	...	1	...	1	...	3	...	1	...	1	...	4	2	6	2	71	42	4	5	4	39	79	86
April	...	...	...	...	...	...	...	...	1	...	...	1	4	3	5	4	72	46	3	3	3	36	78	85
May	3	...	...	...	...	1	3	1	...	1	...	...	1	...	1	1	127	35	5	2	20	36	152	73
June	3	...	...	...	...	...	3	...	1	...	...	...	1	1	2	1	91	55	5	5	3	35	99	95
July	2	...	...	...	...	1	2	1	3	1	...	...	...	...	3	1	75	60	6	6	...	39	81	105
August	...	...	...	...	...	1	...	1	1	3	...	...	...	...	1	3	65	54	10	3	3	40	78	97
September...	...	...	...	...	...	...	...	...	1	...	...	...	3	1	4	1	99	42	8	1	2	35	109	78
October	3	...	...	...	3	...	6	...	1	...	...	...	2	1	3	1	64	42	2	3	16	42	82	87
November ...	8	1	1	...	...	...	9	1	2	2	...	...	...	1	2	3	78	47	2	4	6	32	86	83
December ...	19	4	1	...	5	1	25	5	4	2	...	...	...	3	4	5	85	36	4	8	16	40	105	84
Totals......	41	6	3	...	13	8	57	14	16	10	2	2	19	15	37	27	1,051	533	61	48	83	441	1,195	1,022

* Notifiable only in Blackheath and Katoomba Municipalities and the Blue Mountain Shire..

Table VI.—Showing the number of Cases of Infectious Diseases notified in the State of New South Wales during the years 1898 to 1925, inclusive, and the number of deaths therefrom.

Year.	Population.	Typhoid Fever.		Scarlet Fever.		Diphtheria.		Plague.*		Infantile Paralysis.†		Cerebro-spinal Meningitis.‡		Pulmonary Tuberculosis.§		Total Deaths from Phthisis in N.S.W.§
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	
1898	1,323,130	3,302	387	6,342	83	1,493	169	...	...	...	...	...	...	...	...	1,104
1899	1,344,080	2.783	347	1,389	25	741	60	...	...	...	...	...	...	...	...	1,078
1900	1,364,590	3,442	398	895	9	726	63	303	103	...	...	...	...	...	...	1,056
1901	1,376,193	2,702	291	1,288	16	922	131	...	...	...	...	...	...	...	...	1,134
1902	1,397,858	2,624	276	2,010	61	757	74	140	41	...	...	...	...	...	...	1,123
1903	1,416,879	4,855	475	5,358	87	1,214	134	2	...	...	...	...	...	...	...	1,235
1904	1,440,919	2,370	249	4,056	50	1,584	156	12	6	...	...	...	...	146	...	1,156
1905	1,469,153	2,226	239	1,773	21	1,118	102	56	21	...	...	...	...	128	...	1,037
1906	1,498,009	2,373	271	3,085	42	1,219	109	20	8	...	...	...	...	118	...	1,007
1907	1,531,980	1,972	189	2,570	26	1,376	133	51	20	...	...	...	...	161	...	961
1908	1,560,026	2,607	307	2,755	40	2,001	123	6	3	...	...	...	...	112	...	1,008
1909	1,596,685	2,615	287	7,178	30	2,419	166	24	7	...	...	...	...	196	...	1,040
1910	1,638,220	2,714	294	1,642	23	4,989	207	...	...	...	...	...	...	184	...	1,024
1911	1,698,735	1,864	184	2,618	11	4,784	226	...	...	...	...	...	...	222	...	1,099
1912	1,778,962	2,126	236	662	11	5,440	253	...	...	...	...	...	...	265	...	1,078
1913	1,832,546	2,187	236	1.120	23	6.380	310	...	...	47	10	...	...	228	...	1,210
1914	1,862,028	2,284	250	3,207	21	5,831	247	...	...	79	14	...	...	293	...	1,178
1915	1,868,644	1.941	219	8,335	97	5,838	264	...	...	63	11	50	33	361	86	1,122
1916	1,846,736	1,742	209	5.759	107	6,588	309	...	...	311	21	309	145	1,499	666	1,157
1917	1,886,701	1,091	103	2,255	27	5,805	247	...	...	16	12	197	98	1,319	584	1,017
1918	1,928,174	810	112	1,308	15	5,151	221	...	...	50	12	120	80	1,308	586	1,093
1919	2,006,173	857	106	959	10	2,826	114	...	...	8	3	23	23	1,102	678	1,216
1920	2,099,763	1,016	132	937	24	5,043	263	...	...	45	10	34	27	1,509	674	1,118
1921	2,128,786	949	129	1,060	8	6,854	306	2	1	184	22	30	28	1,240	791	1,129
1922	2,174,688	706	99	1,153	11	4,094	207	33	9	33	5	21	22	1,045	517	1,080
1923	2,211,106	873	104	2,623	13	3,480	176	1	1	104	8	27	22	1,218	657	1,109
1924	2,255,649	768	97	3,421	29	4,364	222	...	...	108	6	20	38	1,096	730	1,165
1925	2,300,081	533	80	3,043	27	3,004	118	...	...	57	14	37	27	1,195	617	1,022

* Notifiable from 23rd January, 1900.
† „ 1st February, 1912.
‡ „ 11th October, 1915.
§ „ 18th October, 1904, in the city of Sydney only; and under Public Health (Amendment) Act, 1915, from 11th August, 1915, in the Metropolitan and Hunter River Districts; from 2nd October, 1916, in the Katoomba Municipality and Blue Mountain Shire, and from 17th December, 1920, in the Blackheath Municipality. At time of writing it is not notifiable elsewhere in the State.

GRAPHS.

Annual Death-rate per 100,000 and case rate per 10,000 of population—
Typhoid Fever ... ... } 1898–1925.
Scarlet Fever ... ... }
Diphtheria... ... ... }

Annual Death-rate per 100,000 of population—
Cancer and Tuberculosis... ... ... } 1875–1925.
Diarrhœa and Enteritis (under 2 years) ... ... }
„ „ (2 years and over) ... ... }
Measles ... ... }
Whooping Cough ... ... }

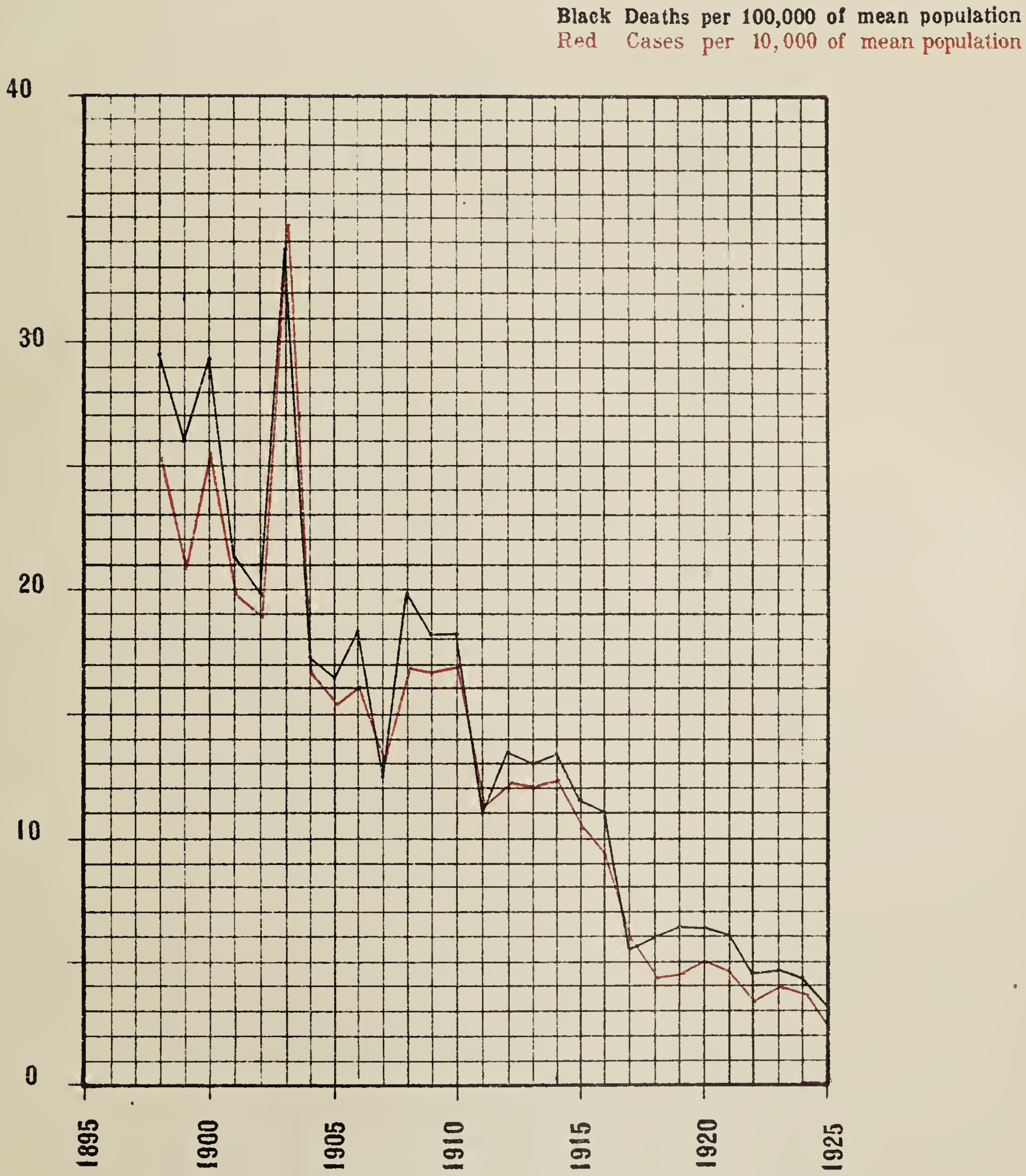
Annual Death-rate of Children under 1 year per 1000 births ... 1875–1925.

Annual Death-rate of Women per 1,000 births—
Childbirth and Puerperal Septicæmia ... ... 1875–1925.

Annual Death-rate per 1,000 of population in New South Wales... 1875-1925.

TYPHOID FEVER.

ANNUAL DEATH RATE PER 100,000 AND CASE RATE PER 10,000 OF POPULATION
IN
NEW SOUTH WALES,
1898–1925.



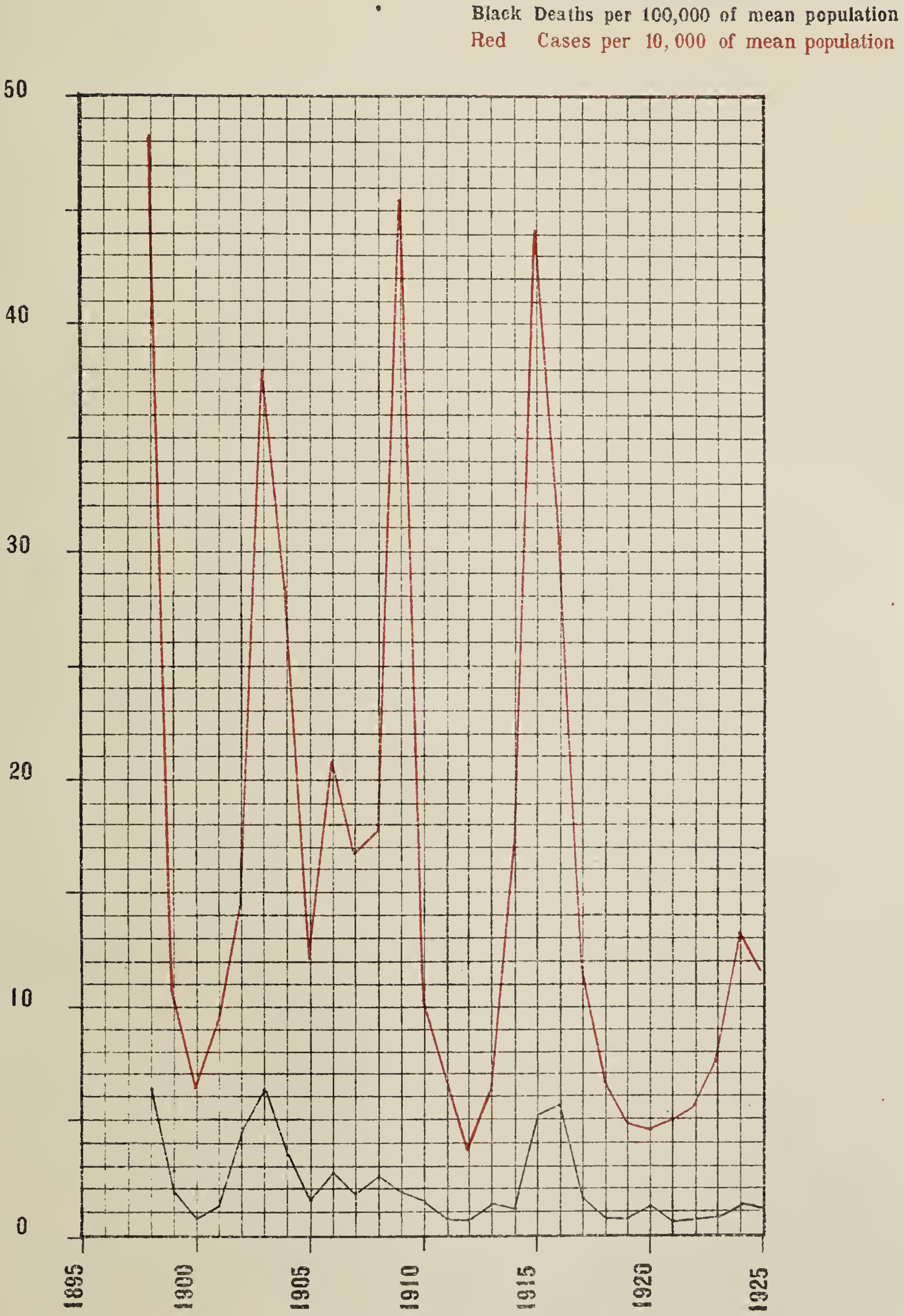
SCARLET FEVER.

ANNUAL DEATH RATE PER 100,000 AND CASE RATE PER 10,000 OF POPULATION

IN

NEW SOUTH WALES,

1898-1925



DIPHTHERIA

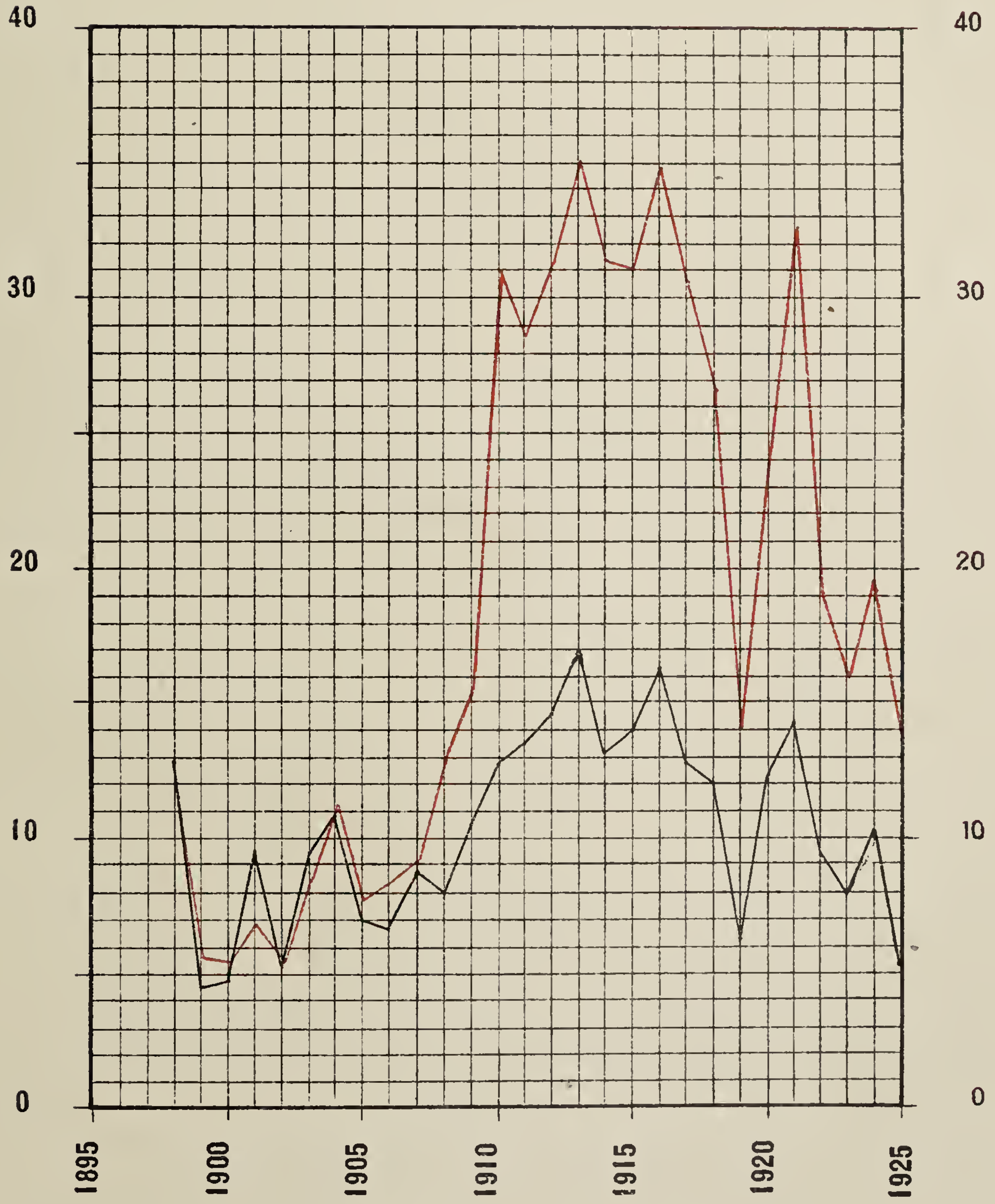
ANNUAL DEATH RATE PER 100,000 AND CASE RATE PER 10,000 OF POPULATION

IN

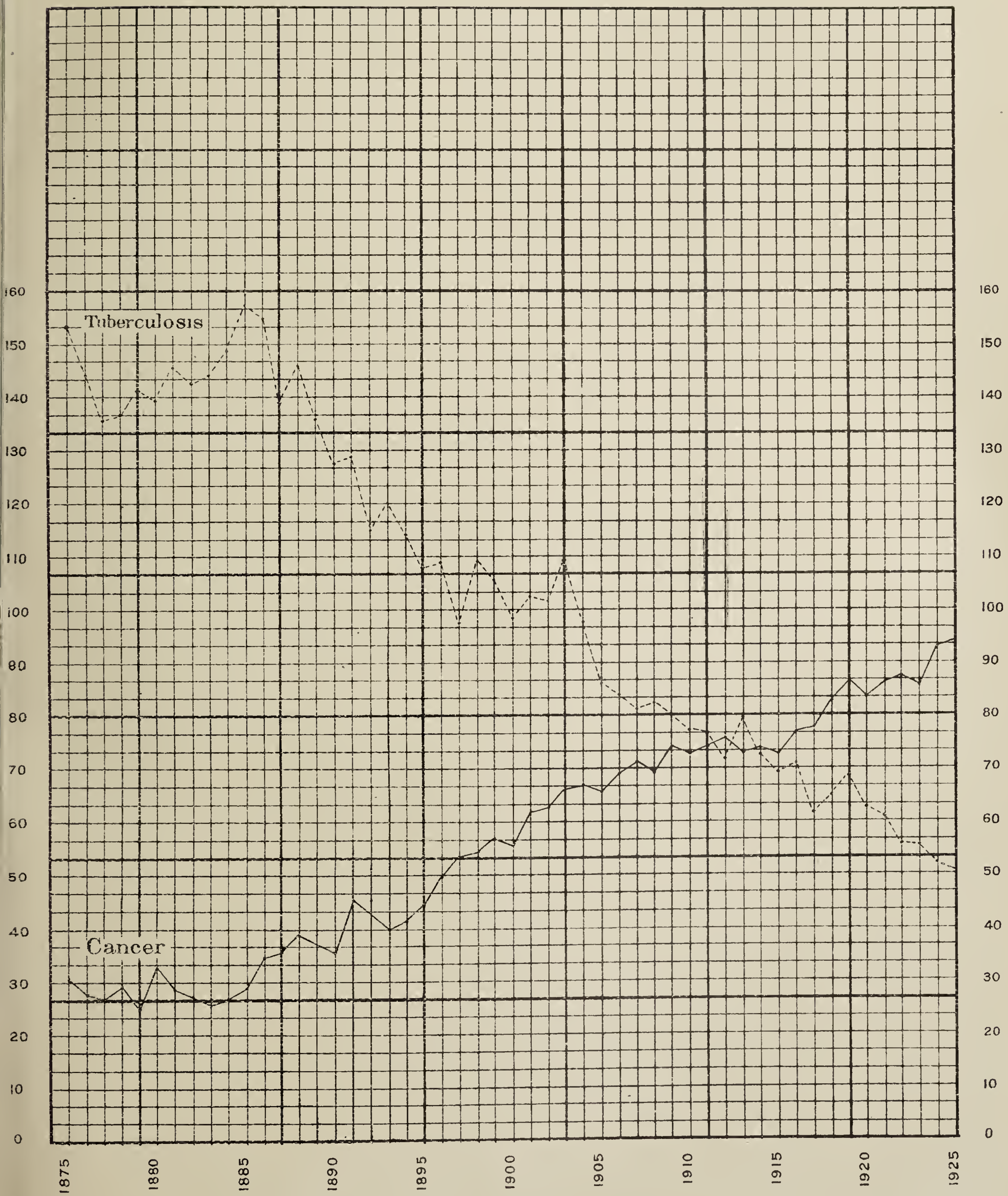
NEW SOUTH WALES,

1898–1925.

Black Deaths per 100,000 of mean population
Red Cases per 10,000 of mean population

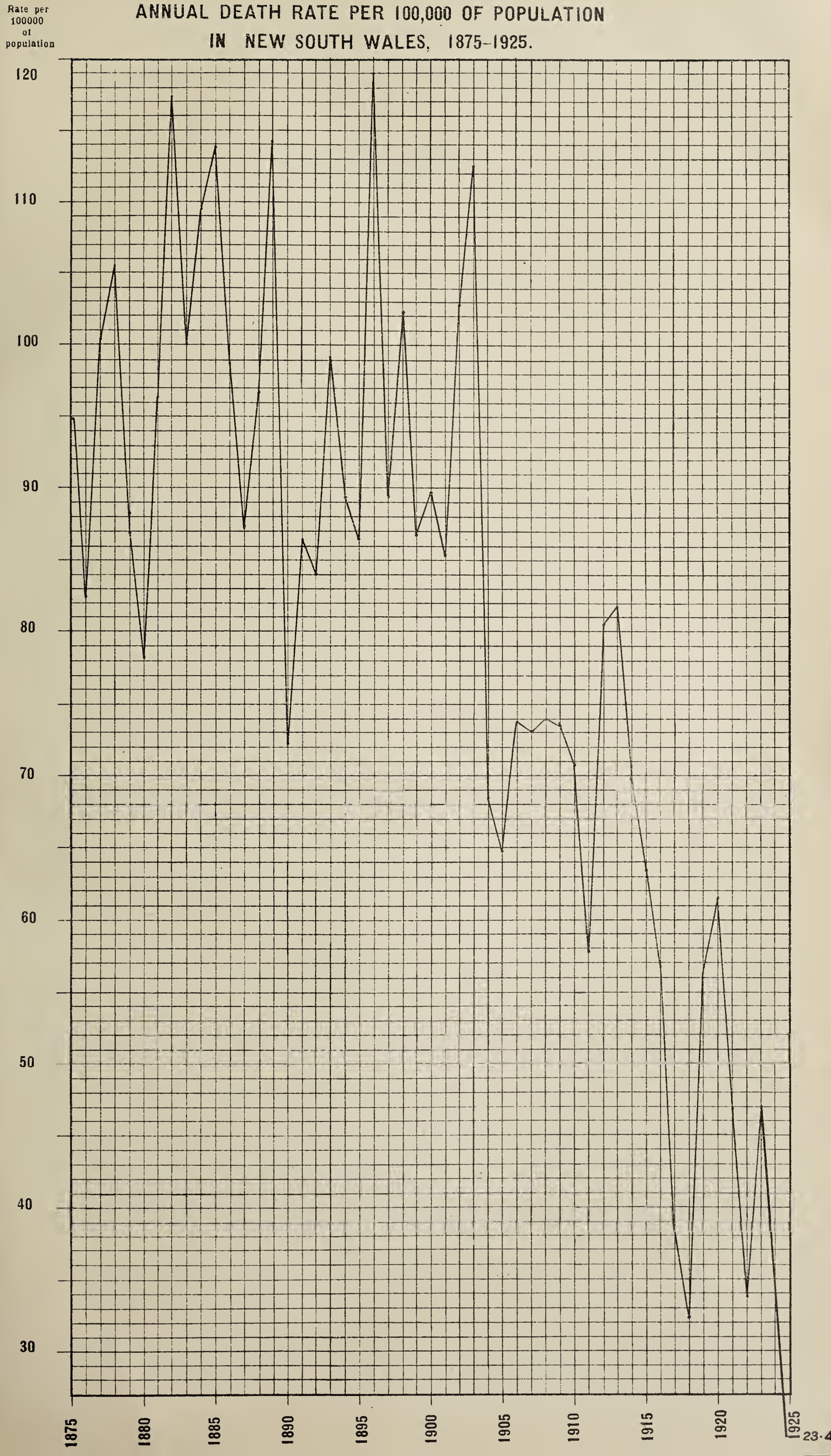


CANCER AND TUBERCULOSIS.
ANNUAL DEATH RATE PER 100,000 OF POPULATION
IN
NEW SOUTH WALES
1875 - 1925.



DIARRHŒA AND ENTERITIS (Under 2 years).

ANNUAL DEATH RATE PER 100,000 OF POPULATION IN NEW SOUTH WALES, 1875-1925.



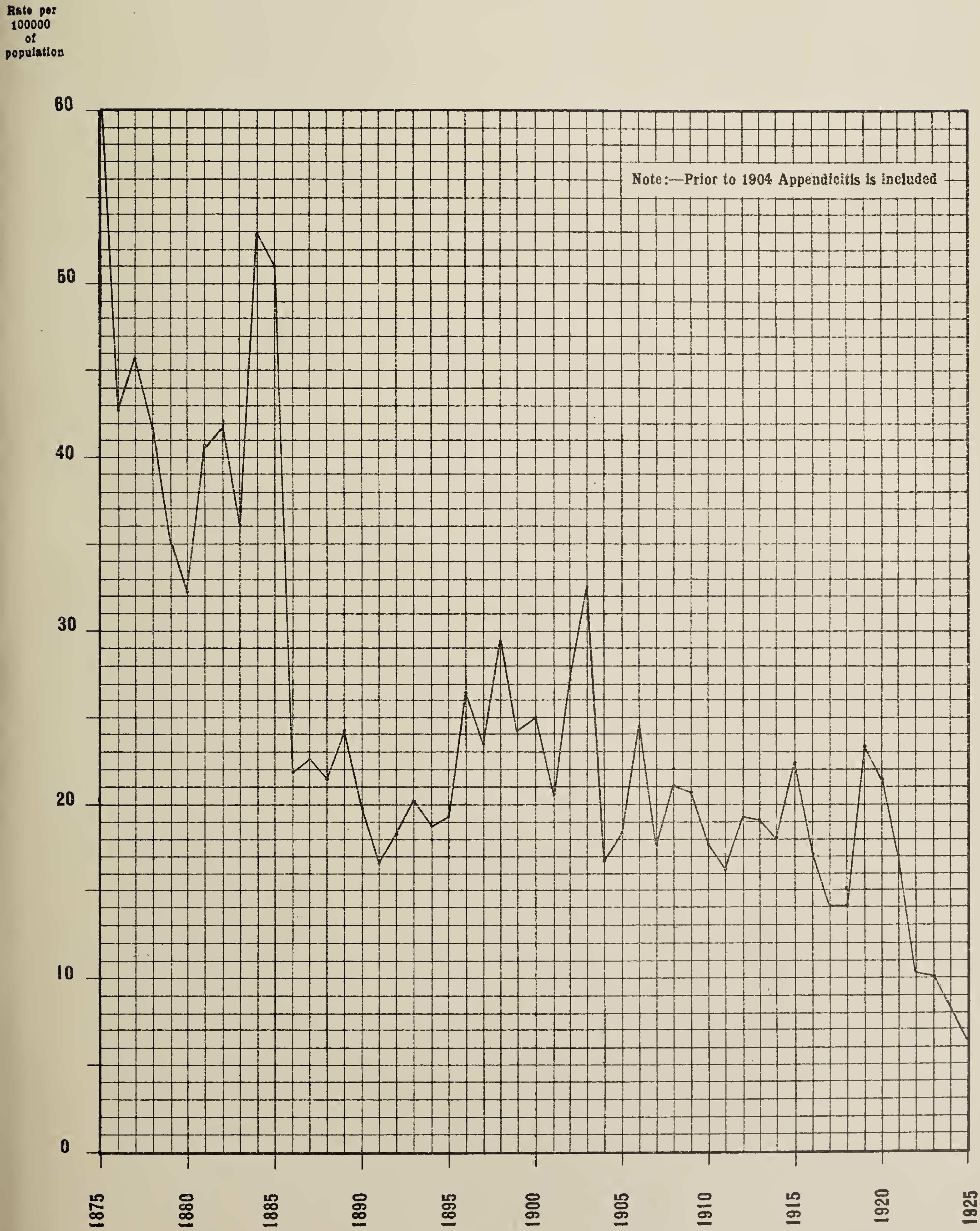
DIARRHŒA AND ENTERITIS (2 years and over).

ANNUAL DEATH RATE PER 100,000 OF POPULATION

IN

NEW SOUTH WALES,

1875-1925.



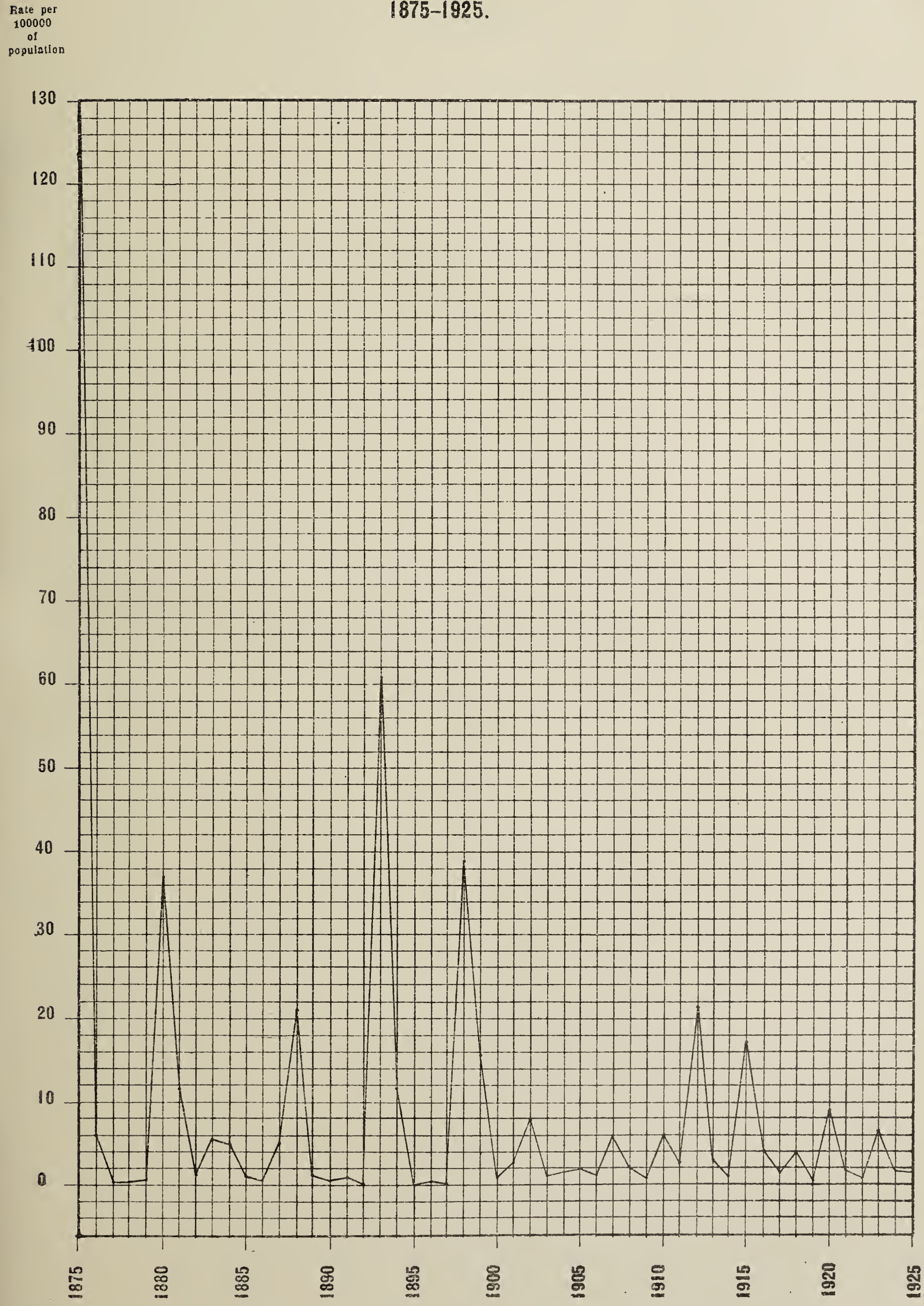
MEASLES.

ANNUAL DEATH RATE PER 100,000 OF POPULATION

IN

NEW SOUTH WALES,

1875-1925.



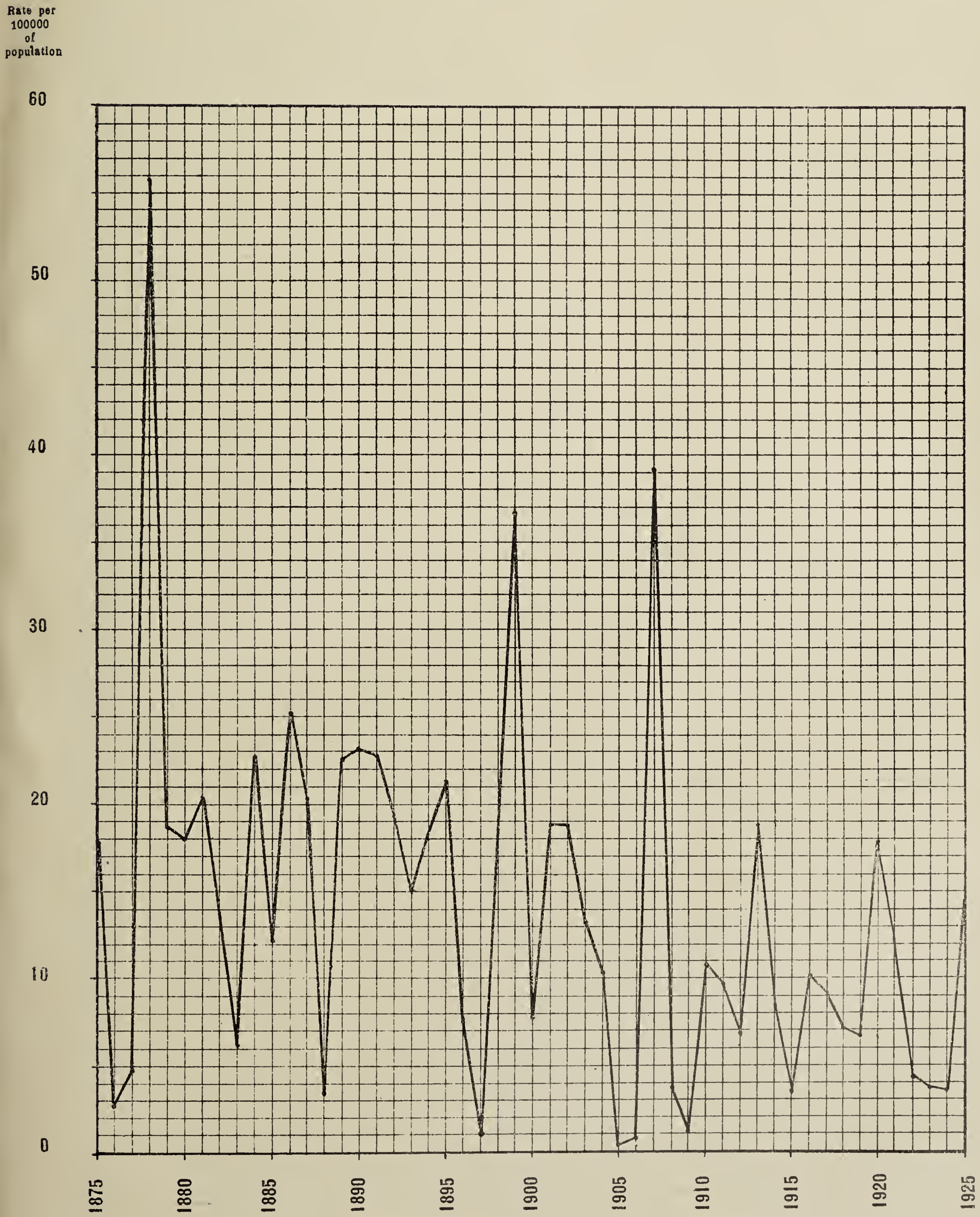
WHOOPING COUGH.

ANNUAL DEATH RATE PER 100,000 OF POPULATION

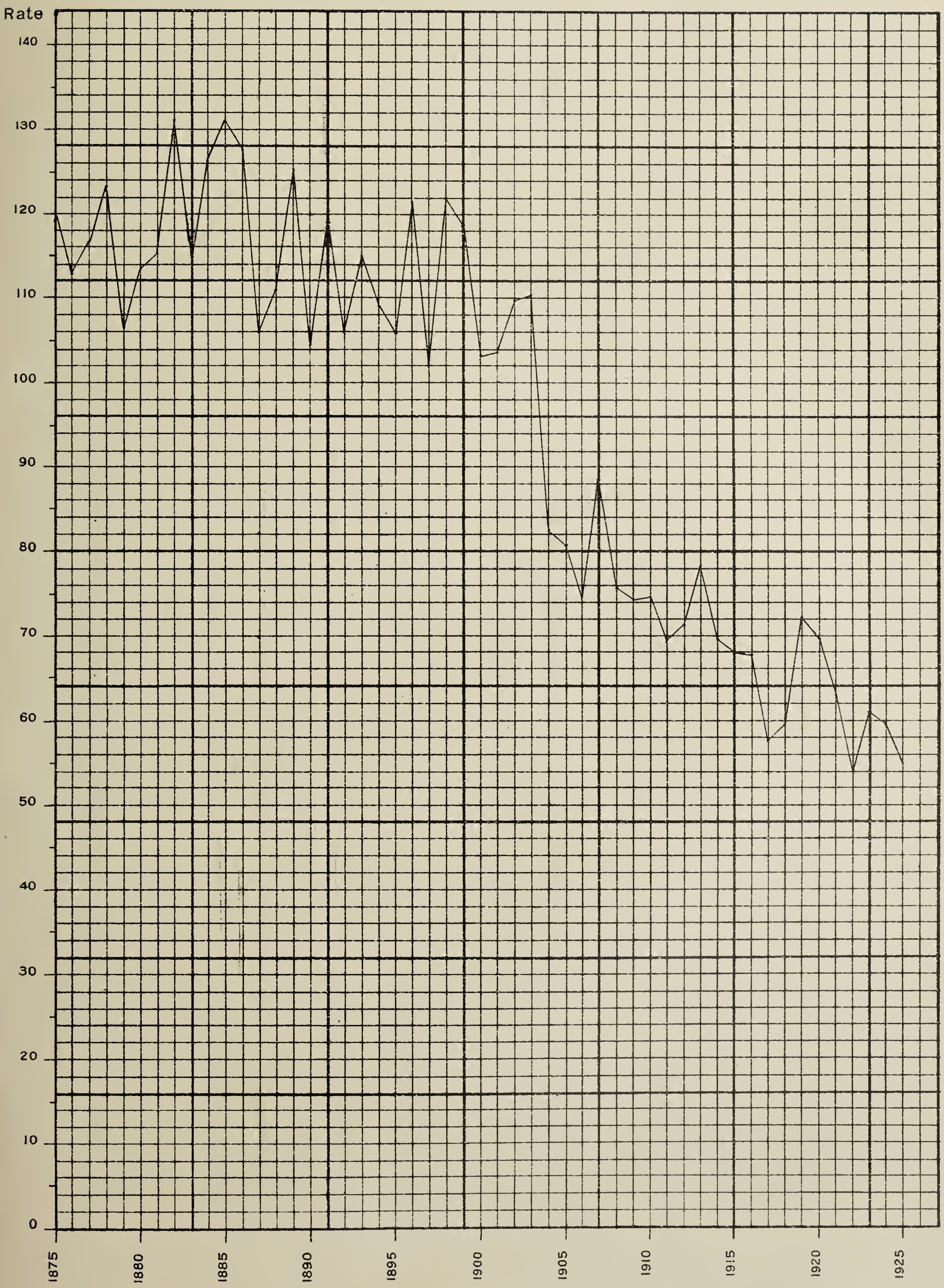
IN

NEW SOUTH WALES,

1875-1925.



INFANTILE MORTALITY
ANNUAL DEATH RATE OF CHILDREN UNDER 1 YEAR PER 1,000 BIRTHS
IN
NEW SOUTH WALES
1875-1925.



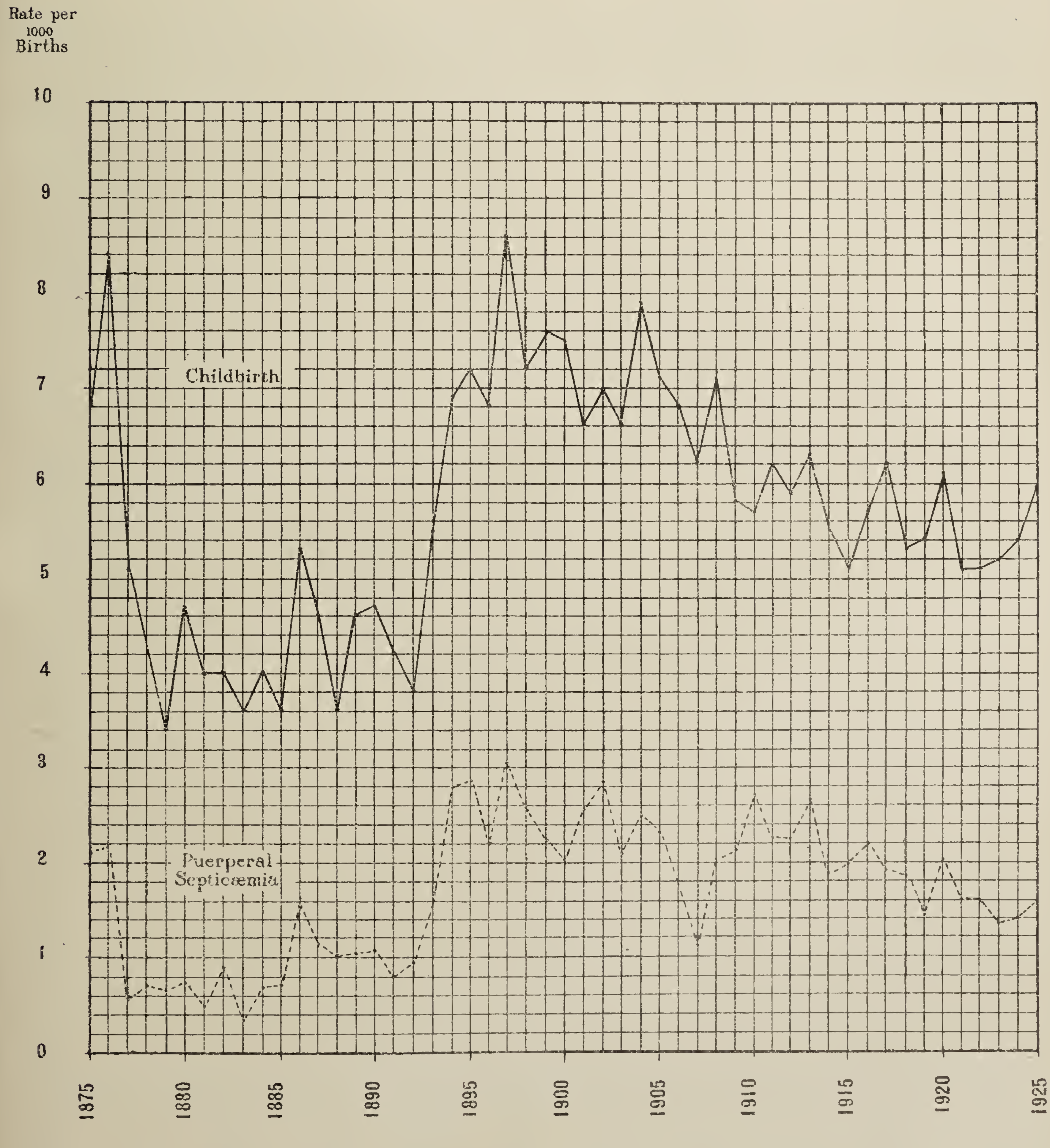
CHILDBIRTH AND PUERPERAL SEPTICÆMIA.

ANNUAL DEATH RATE OF WOMEN PER 1,000 BIRTHS

IN

NEW SOUTH WALES,

1875-1925.

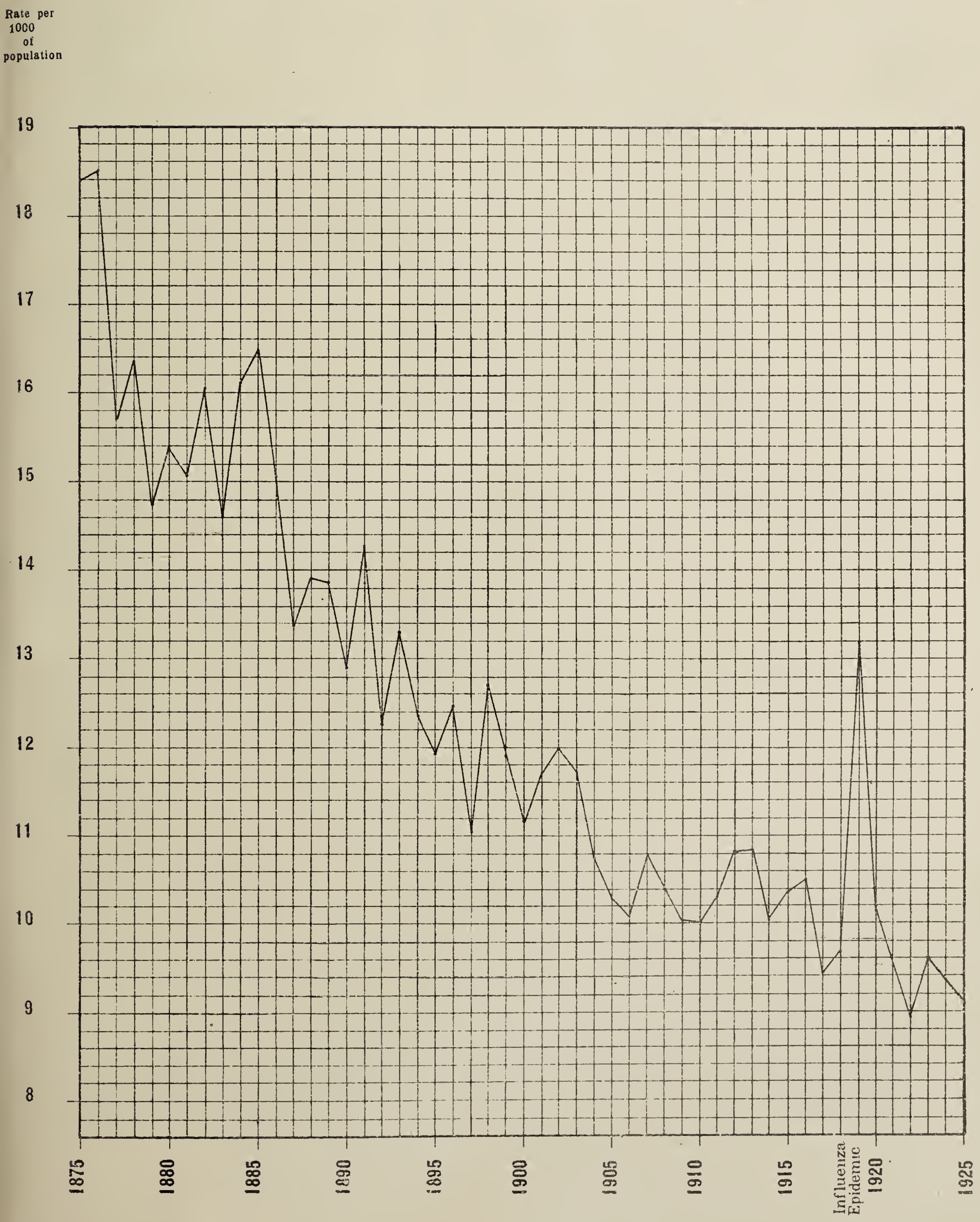


ANNUAL DEATH RATE PER 1,000 OF POPULATION

IN

NEW SOUTH WALES,

1875-1925.



NOTES ON TYPHOID FEVER AT BROKEN HILL

(Dr. E. W. Ferguson.)

Advantage was taken of a visit to Broken Hill in June, 1925, to investigate the cases of typhoid fever which had occurred there during the previous six months and to inquire generally into the question of typhoid at Broken Hill. This inquiry was undertaken because it had been suggested that the Broken Hill cases were not true typhoid fever. The reasons for the suggestion were—(*a*) the relatively low mortality as compared with typhoid elsewhere; (*b*) the failure to obtain bacteriological proof that the disease was typhoid. The inquiry served to show that the disease was true typhoid fever, both in its clinical and bacteriological characters. The objections raised are discussed in the body of the report.

Typhoid fever is endemic at Broken Hill, the month of greatest incidence appearing to be May. The annual figures for the past twelve years are as follows:—

Year.	Notifications.	Deaths.	Death-rate.	Year.	Notifications.	Deaths.	Death-rate.
			Per cent.				Per cent.
1913	217	19	8·7	1920	66	7	10·6
1914	395	43	10·9	1921	72	2	2·8
1915	147	Not available.	......	1922	115	3	2·6
1916	146	18	12·3	1923	121	7	5·7
1917	88	7	7·97	1924	50	5	10
1918	47	11	22	1925 (6 months) ...	63*	4	6·3
1919	56	1	1·78				

* Does not include doubtful cases Nos. 27 (A. A.) and 60 (E. P.); and Police District case No. 58 (J. McB.).

It will be noted from the above table that though greater than in 1924 the number of cases for the first six months of 1925, which includes the epidemic months, is not excessive as compared with other years. For the whole year there were 80 notified cases. (See Table II, p. 45.)

The rate per 100,000 of population, however, shows that typhoid is more prevalent in proportion to the population than in the Metropolitan Sanitary District or in the Hunter River Combined Sanitary Districts. It is, however, less than in some country centres. The rates per 100,000 of population for 1924 and 1925 for a number of the larger towns of New South Wales and for the Metropolitan and Hunter River Sanitary Districts have been tabulated. (Table II.) It must be emphasised in regard to this table that the incidence of typhoid fever varies greatly in many country towns from year to year, and furthermore that 1924 and 1925 were relatively light years for typhoid throughout the country.

Cases of typhoid fever in 1925.—From January up to the end of June some 64 cases of typhoid occurred in Broken Hill, exclusive of those cases already in hospital at the beginning of the year. Of this number four died, two from perforation of the bowel and one from hæmorrhage. Attached is a list of the cases with the data as regards the Widal test, leucocyte count, and the results of examination of blood, fæces, and urine for typhoid bacilli.

Diagnosis.—In the earlier part of the year difficulty was experienced in obtaining positive laboratory findings with cases that were clinically typhoid. This led to the suspicion that the epidemic was not typhoid but some allied febrile condition. The comparatively low death-rate also suggested some abnormal cause.

Reference to the list of cases shows that in 55 cases clinically typhoid at the Broken Hill hospital, of which the bacteriological data are available, the results of these examinations may be summarised as follows:—

Widal Reactions.—Positive in 43 cases for *B. typhosus* and positive for *Paratyphosus* "*A*" in 1 case; partially positive for *B. typhosus* in 4 cases and negative in 7.

B. typhosus was grown from the blood in 8 cases out of 17 in which blood cultures were made.

B. typhosus was grown from the urine four times and from the fæces once.

Of the 4 cases which gave partial positive Widals, 1 (No. 56) died of hæmorrhage, and the other 3 were apparently typical typhoid. Of the 7 cases which gave negative Widals, 2 (No. 43 and No. 59) gave positive blood cultures, and the remaining 5 were apparently typical typhoid, and in 4 of them there were either enlarged spleens or rose spots or both.

Adding Nos. 56, 43, and 59 to the 43 positive Widals it, appears that 46 cases were proved to be typhoid by bacteriological methods and 1 to be paratyphoid "A." In 4 cases no information could be secured as regards the bacteriological findings, if any tests were done; and 4 cases occurred during the latter part of June after my visit.

The proportion of positive Widal reactions (43) to the number of cases examined (55) is good (78 per cent.) and better if the 4 incomplete positives are included (89 per cent.).

The blood cultures were attempted only spasmodically in the early portion of the epidemic, and it was not till April that systematic blood cultures were done on admission. Considering the fact that the typhoid bacilli early disappears from the peripheral blood, the result, 8 out of 17, must be regarded as distinctly good. The fæcal and urinary examinations were not made as a rule until convalescence, it being the custom to require three negative results in ten days before the patient was discharged. It is to be anticipated that many would be negative. I formed the opinion, however, that these examinations were faulty in technique and suggested alterations which are being carried out with satisfactory results.

The clinical histories of the cases were not noted in detail, but I went through most of the case sheets and also saw many of the patients, and there is no question that clinically the majority were typical typhoid.

The spleen was noted as enlarged in 19 cases and spots were noted as present in 25. Defervescence was slow in many instances and relapses occurred in a number of cases. In one case a positive blood culture was obtained during a second relapse. Hæmorrhage was rare. This fact was commented upon by the medical staff, but one case died as the result of hæmorrhage. Perforation occurred three times, two of the cases being fatal, and the third was operated upon with good results. The two fatal cases probably perforated before admission.

A few of the cases gave an onset suggestive of pneumonia, if this were not actually a complication.

The leucocyte count was below normal (7,500) in 28 cases, and above normal in 24, the increases ranging from 8,000 to 19,000; in all these cases showing leucocytosis only a single count appears to have been done, in at least 2 cases a leucocytosis was followed by leucopenia.

Doubtful cases.—In addition to the 64 cases of typhoid, there were 2 cases which were doubtfully regarded as such, but not notified.

A. A., No. 57, aged 16, admitted 9th January, 1925, discharged 28th February, 1925. The widal was negative, the leucocyte count 8,800. Spleen enlarged to percussion, not palpable, no rash. Urine and fæces negative for *B. typhosus.*

E. P., No. 60, aged 7, admitted to Broken Hill hospital on 7th January, 1925, and discharged on 29th January, 1925. The diagnosis was (?) typhoid fever. The clinical history suggests typhoid, the principal symptoms appear to have been high temperature (105 deg. on admission) and drowsiness. The temperature fell by lysis and becoming normal on 13th January, 1925. The spleen was palpable and roseolar spots were present. The widal was negative on two occasions, the leucocyte count 7,400. Examinations of the urine and fæces were negative.

The course of the disease was too short for typhoid, unless the case was an abortive one; there is a history of only three days' illness before admission and the febrile period in hospital was only six days. The enlarged spleen and the spots are nevertheless suggestive.

Cases from outside the municipality.—One case was treated at Broken Hill hospital from a station, Netley, in the police district outside the municipality.

J. McB. (m.), No. 58, aged 46, admitted on 23rd May, 1925, probable date of onset 2nd May, 1925. The patient was admitted in what was apparently the third week of typhoid. He gave a leucocyte count of 4,700 and a positive widal (1:40). The widal was to some extent discounted by the fact that he had been inoculated with T.A.B. during the war. He was discharged from the hospital about 16th June, 1925. The case was notified, but appears on the police district list.

Distribution of cases.—It was found from the addresses of patients that the cases are well distributed in the town. Practically every district in Broken Hill is represented. Several cases occurred in the one street, but in those instances the residences were widely separated. It is to be noted in this connection that the residences in Broken Hill are for the most part detached, the blocks are large and the streets long. An impression was gained, however, that on the whole cases were more numerous from the north end of the town; this does not mean, however, that in this locality infected houses were close together.

In a few instances more than one case occurred in the one place. Six cases occurred in hotels, 2 cases being from the one hotel. These two cases (No. 23 and No. 51) are separated by a month's interval. The other instances of cases occurring in one residence are familial infections. Of these there were three examples.

D. B. (f.), No. 22, aged 9, admitted to hospital on 6th April, 1925; and her father, W. B. (m.), No. 39, aged 56, admitted to hospital on 22nd May, 1925.

B. B. (f.), No. 37, aged 3, admitted to hospital on 7th May, 1925; her brother, F. B. (m.), No. 48, aged 10 months, admitted on 22nd May, 1925; and her mother, A. D. B. (f.), No. 63, aged 32, admitted to hospital on 9th June, 1925.

M. J. B. (f.), No. 64, aged 7; and P. R. (f.), No. 65, aged 2, apparently admitted together and notified on 25th June, 1925. As these last two cases occurred after my visit to Broken Hill, I have no further information regarding them.

Seasonal incidence.—While typhoid fever is endemic in Broken Hill throughout the summer months, the incidence is nevertheless greatest towards the end of the summer and in the autumn. The monthly returns compiled from the notifications for the first six months of 1925 are as follows :—

January.	February.	March.	April.	May.	June	Total for 6 months.
6	4	7	16	20	10	63*

* Exclusive of doubtful cases No. 57 (A. A.) and No. 60 (E. P.) and Police District case No. 58 (J. McB.)

The figures require some correction as cases occurring late in the month may be notified early in the following month. Furthermore a number of cases were admitted to hospital two to three weeks after the onset of illness and others were not notified for some time after admission, owing to the doubt in the diagnosis. I have therefore corrected the seasonal incidence utilising where available the probable date of onset from data supplied at the hospital and in other cases the date of admission to the hospital. This corrected incidence is also merely an approximation since two series of dates are used and also because the date of infection should be 10-14 days before the date of onset.

January.	February.	March.	April.	May.	June.	Total for 6 months.
6	7	10	19	15	6	63*

* Exclusive of doubtful cases No. 57 (A. A.) and No. 60 (E. P.) and Police District case No. 58 (J. McB.)

This shows that the greatest seasonal incidence is in April or, allowing for the incubation period, late March or early April.

Age incidence.—Tables have been prepared to show the age incidence of typhoid fever at Broken Hill compared with the age incidence in other rural areas in New South Wales. The figures are for the first six months of 1925. The corresponding figures for the Metropolitan district and for the combined Newcastle and Hunter River Sanitary district for this period are not available at this office.

The percentage of cases of each age group to the total number of cases of typhoid from each area has been charted and is shown on the accompanying graph. The figures on which this graph is constructed are small, but the graph is suggestive. Apparently at Broken Hill the main incidence of typhoid falls into two age groups, viz., 5–9, and 20–24. Comparison with other rural districts indicates that this is not peculiar to Broken Hill as there is a similar rise in the incidence of typhoid in these age groups. The figures require to be correlated with the age distribution of the population in the different areas. This has not been possible at present.

Further comparisons should also be made with the age distribution of cases throughout the State and extending over several years before reliable deductions can be made.

Sex incidence.—34 of the cases were males and 29 females. In the earlier years females were more often affected than males, in the 5–9 age group 3 males are included as against 10 females. In the later age groups males predominate over females.

Case mortality.—Reference to Table I will show that the death rate from typhoid at Broken Hill has varied with rather wide limits. Dr. R. Dick, who reviewed the typhoid at Broken Hill from 1916–1923, in a report dated 25th March, 1924, noted a fatality rate of 7·9 per cent. over this period. In the present year 4 cases have died out of 63, a fatality rate of 6·3 per cent.

The low case mortality of typhoid at Broken Hill has been adduced as one of the reasons for thinking that the disease at Broken Hill may not be typhoid but an allied febrile disorder. The variation of the case mortality for different years is also unusually great. Comparison with the case mortality for the whole of New South Wales over a period of eleven years (1913–1923 inclusive) shows that the case mortality is nearly always above 10 per cent. of the cases and does not vary to the extent found in the Broken Hill series.

Since the typhoid at Broken Hill is shown on a bacteriological evidence to be due to infection with *B. typhosus,* some other factor or factors must be sought to account for the low case mortality and its variation. This involves statistical inquiries into age distribution of the cases and deaths, &c., which cannot be fully followed out at present (see under previous section).

Causation.—Inquiries were made into the probable ætiological factors influencing the occurrence of typhoid at Broken Hill. The history of typhoid in this locality shows that the disease is endemic and has a seasonal incidence. Within recent years there is nothing in the nature of an explosive outbreak. Furthermore, cases are spread throughout the town. The possible causes that must be considered are (1) milk supply, (2) water supply, (3) food contamination by carrier, (4) general sanitation.

1. *Milk supply.*—This can be ruled out of court straight away. Different vendors supplied the households of the different cases; in many instances the people used their own goat's milk, in many others condensed milk was used.

2. *Water supply.*—The town water supply is from Umberumberka some 25 miles distant. The mines are supplied from Stevens Creek reservoir, about 12 miles from Broken Hill. Both reservoirs were visited; the water is comparatively low in each and has been lower. The Umberumberka reservoir should be free from any chances of pollution. With the exception of the engineer s house all other dwellings are situated on the creek well below the dam.

The Stevens Creek reservoir receives water from Stevens and other creeks along which there is some settlement, but the water is not used for the general town supply.

Furthermore a water infection would be characterised by an outbreak of an explosive nature, probably affecting a much larger number of people.

3. *Infection of food supplies by a carrier or case.*—This mode of infection might apply in individual cases and probably does in familial outbreaks, but would not account for the series of cases over the whole town. Outbreaks due to food contamination are explosive in nature, as in the Coonamble outbreak in 1903 and in the Nyngan outbreak in 1923.

4. *General sanitation.*—The probable source of the greater part of the typhoid in Broken Hill is to be looked for in the general state of the sanitation of the town. The whole town is now on the double pan system, the pans being removed weekly. I inspected a number of privies in and around properties from which cases of typhoid had come. Many of the privies were constructed of galvanised iron by no means fly proof. Seats were mainly wooden benches with or without a riser, generally without cover and the pails were as a rule removed from the back which abutted on to the lane at the rear. In many instances the flaps guarding opening for the removal of the pans were broken or the hinges were off or the flaps entirely gone. There appeared therefore to be every facility for flies to gain access to the pan contents and to fly away again.

It will be noted that the seasonal incidence of typhoid corresponds very well with the season of greatest fly prevalence, that is the late summer and autumn. In the height of summer the dry climate tends to reduce the number of flies.

The distribution of the cases would also be accounted for by spread of infection through the medium of flies, as these insects might easily transport the infection to some little distance from where it was picked up.

Since typhoid has been endemic in Broken Hill for a number of years it is highly likely that there are a number of persons in the town who have previously had the disease and who may be discharging the organism in their excretions. Whether the sanitary system could be improved is a matter of enquiry. Certainly the householders might be compelled to make privies fly proof, but this would entail a more regid and constant supervision than is possible with the present staff.

The possibility of a water carriage system for Broken Hill was discussed with various people in the town. This seems impossible with the present town supply, which is only just sufficient for the needs of the populace and is really insufficient in dry years. A scheme for procuring water from the Darling has been advocated. This is a question of engineering and expense, involving also the question of the probable life of the mines and is beyond the scope of this report.

The question of the instalment of chemical closets might however be made the subject of further inquiry.

Conclusions.—

(1) Typhoid is endemic at Broken Hill with a distinct seasonal incidence.
(2) The cases are distributed throughout the town and are not the result of an explosive outbreak.
(3) Bacteriological tests have proved that the disease is typhoid fever due to infection with *B. typhosus.* The clinical features of the disease support the bacteriological findings.
(4) The number of cases in 1925 though greater than in 1924 is not excessive when compared with previous years.
(4) The occurrence of cases is probably due to defective sanitation, allowing flies access to infected excrement. No evidence was found to incriminate either the water or milk supplies.

Appended are the following:—

(1) Table I, showing results of bacteriological examinations.
(2) Table II, showing case incidence per 100,000 of population for the whole State, Metropolitan and Hunter River combined districts, and larger country towns, 1924 and 1925.
(3) Table III, showing age incidence of cases of typhoid fever at Broken Hill and in rural districts of New South Wales, 1st January to 30th June, 1925, with graph.
(4) Table IV, showing case mortality, whole State, 1913–1925.

TABLE I.—Typhoid Fever, Broken Hill, 1925. Result of Bacteriological Examinations of 66 Notified Cases, 1st January to 30th June, 1925.

Name.	Sex.	Leucocyte Count.	Widal.	Blood Culture.	Faeces.	Urine.	Spots.	Spleen.
1. H. B.	M	8,000 5,400	+	......	—	—	+	......
2. R. J. V.	M	....	—	......	......	......	+	—
3. D. B.*	F	....	......	......	......	......	......	......
4. M. V.	F	7,200	+	......	—	—	+	+
5. R. E. B.	M	4,000	+	......	—	—	+	—
6. M. T.	F	9,400	+	......	—	—	—	+
7. Mrs. B. F.*	F	....	......	......	......	......	......	......
8. J. B.*	F	....	......	......	......	......	......	......
9. R. L.	M	13,400	+	......	—	—	+	+
10. E. G.	F	9,000	+ (Para. A).	......	—	—	+	+
11. C. K.	M	11,200	+	......	......	......	......	......
12. R. O'L.	M	10,500	+	......	—	—	+	+
13. J. L.	M	7,800 7,800 5,000	—	......	—	—	+	+
14. L. S.	M	19,000	B.T. + Para. B. +	......	—	—	—	—
15. O. J.	F	9,200	+	......	—	—	—	—
16. J. F.	M	12,300	+ —	......	—	—	......	+
17. T. M.*	F	....	......	......	......	......	......	
18. M. E.	F	7,800	B. T. + Para. B. +	......	—	—	+	+
19. P. N.		16,200	+	+	—	—	—	+
20. J. McM.	M	4,800	+	......	+	+	+	+
21. T. J. E.	F	6,200	+	......	—	—	+	—
22. D. B.	F	12,900	+	—	......	......	......	......
23. A. S.	F	6,200	+	......	—	—	—	—
24. I. B.	F	7,000	+	......	—	—	......	......
25. C. J. R.	M	9,200	+	......	—	—	—	+
26. R. L. H.†	M	5,000	+	......	......	......	......	......
27. C. H.	F	6,500 5,500	+	......	—	+	(?) +	—
28. B. P.	F	15,600	+	......	—	—	—	—
29. G. H.	M	....	+	......	—	—	—	—
30. F. B.	M	5,600	+	—	—	—	—	—
31. J. B. L.	M	8,000	+	......	—	—	—	+
32. C. F.	M	5,700	+	......	—	—	—	—
33. J. J.	F	12,600	+	......	—	—	+	+
34. R. W.	M	19,600	+	......	—	—	—	—
35. D. G. S.	F	9,000	+	......	—	—	+	......
36. L. W.	M	18,200 4,600	+	—	......	......	—	+
37. B. D. B.	F	10,700	+	......	—	—	—	—
38. M. G.	F	6,200	+	......	—	—	—	—
39. W. B.	M	3,400	—	—	......	+	+	—
40. A. U.	M	14,700	(?) +	......	—	—	+	—
41. J. H.	M	5,600	+	—	......	......	—	—
42. J. McD.	M	5,900	—	—	......	......	—	—
43.. W. B.	M	3,700	—	+	......	—	+	+
44. A. T.	M	6,100	—	+	......	......	+	+
45. J. L.	M	6,600	+	+	......	—	—	—
46. K. H.	M	12,000	—	......	......	......	+	+
47. R. A. M. W.	F	5,500	+	......	......	......	+	—
48. F. B.	M	16,000	+	......	......	......	+	—
49. J. B.	M	8,000	+	......	......	......	—	—
50. C. J. B.	M	5,000	+	—	......	......	—	—
51. A. J. W.	F	11,800 9,400	+	......	—	+	+	+
52. M. C.	F	13,000	+	......	—	—	—	+
53. M. J. S.	F	5,000	+	......	......	......	—	—

* No information available. † Perforation, died soon after admission.

TABLE I.—Typhoid Fever, Broken Hill, 1925.—Result of Bacteriological Examinations—*continued.*

Name.	Sex.	Leucocyte Count.	Widal.	Blood Culture.	Faeces.	Urine.	Spo's.	Spleen.
54. N. R.	M	3,750	+	+	......	......	......	......
55. K. P.	M	4,700	+	—	......	......	? +	—
56. J. McC.	F	5,200	+	......	......	......	Hæmo	rrhage.
57. A. A. (doubtful case)	M	8,800	—	......	—	—	—	? +
58. J. McB. (police district)	M	4,700	+	—	—	—	—	—
59. C. V.	M	1,300	—	+	—	—	—	—
60. E. P. (doubtful case)	M	7,400	—	......	—	—	+	+
61. J. H.	M	....	+	+	......	......	+	+
62. M. E. D.*	F	....	......	......	......	......	......	......
63. A. D. B.	F	5,500	+	+	......	......	+	......
64. M. J. R.*	F	....	......	......	......	......	......	......
65. P.R.*	F	....	......	......	......	......	......	......
66. D. M. B.*	F	....	......	......	......	......	......	......

* No information available.

TABLE II.—Showing case incidence of typhoid fever in New South Wales per 100,000 of population for the whole State, Metropolitan and Hunter River Combined Sanitary Districts and larger country towns, for the years 1924 and 1925.

District.	1924.			1925.		
	Cases.	Population.	Incidence per 100,000 population.	Cases.	Population.	Incidence per 100,000 population.
Whole State	768	2,230,516	34·43	533	2,306,081	23·11
Metropolitan Combined Sanitary Districts	254	1,150,870	22·07	223	1,165,850	19·12
Hunter River Combined Sanitary Districts	79	176,110	44·85	53	186,790	28·37
Albury	3	7,747	38·72	3	7,747	38·72
Bathurst	3	9,443	31·76	2	9,443	21·17
Bourke	7	1,442	485·43	3	1,442	208·04
Broken Hill	50	26,338	189·83	80	26,338	303·74
Dubbo	7	5,031	139·13	...	5,031	......
Forbes	10	4,379	228·36	6	4,379	137·01
Inverell	5	4,366	114·50	1	4,366	22·9
Lithgow	21	13,276	158·02	9	13,276	67·79
Parkes	4	3,947	101·34	5	3,947	126·67
Quirindi	6	2,235	268·45	1	2,235	44·69
Tamworth	17	7,265	233·99	7	7,265	96·35
Wagga	14	7,676	182·38	1	7,676	13·02
Warren	5	1,142	437·82	...	1,142	......
Wellington	8	3,929	203·61	1	3,929	25·45
Wollongong	3	6,707	44·72	3	6,707	44·72
Cessnock Shire	34	30,213	112·53	1	30,213	3.30

TABLE III.—Showing age incidence of typhoid fever cases at Broken Hill and in Rural Districts of New South Wales, 1st January—30th June, 1925, with graph.

Age.	Municipalites.*			Shires.*			Police Districts.			Total.*			Broken Hill.			Rural Districts, excluding Broken Hill.		
	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.	M.	F.	T.
Under 1	1	...	1	...	...	...	...	...	...	1	...	1	1	...	1	...	...	...
1– 4	2	3	5	1	1	2	...	...	...	3	4	7	1	2	3	2	2	4
5– 9	13	16	29	1	2	3	...	...	...	14	20	34	3	10	13	11	10	21
10–14	10	4	14	4	3	7	...	...	...	13	8	21	4	3	7	9	5	14
15–19	9	5	14	4	1	5	...	...	...	13	5	18	2	1	3	11	4	15
20–24	17	8	25	5	1	6	...	...	...	22	10	32	8	5	13	14	5	19
25–34	15	7	22	6	2	8	...	...	...	20	8	28	10	4	14	10	4	14
35–44	5	4	9	6	6	12	...	...	...	11	10	21	2	1	3	9	9	18
45–54	4	5	9	2	3	5	1	...	1	7	8	15	2	3	5	5	5	10
55–64	4	1	5	1	...	1	..	...	...	5	1	6	1	...	1	4	1	5
65 and over	...	...	...	1	1	2	...	...	...	1	1	2	...	...	...	1	1	[illegible]
Age not stated	2	1	3	1	...	1	...	...	...	3	1	4	...	...	...	3	1	4
	82	54	136	32	20	52	1	...	1	113	76	189	34	29	63	79	47	126

* Excludes Metropolitan and Hunter River Combined Sanitary Districts.

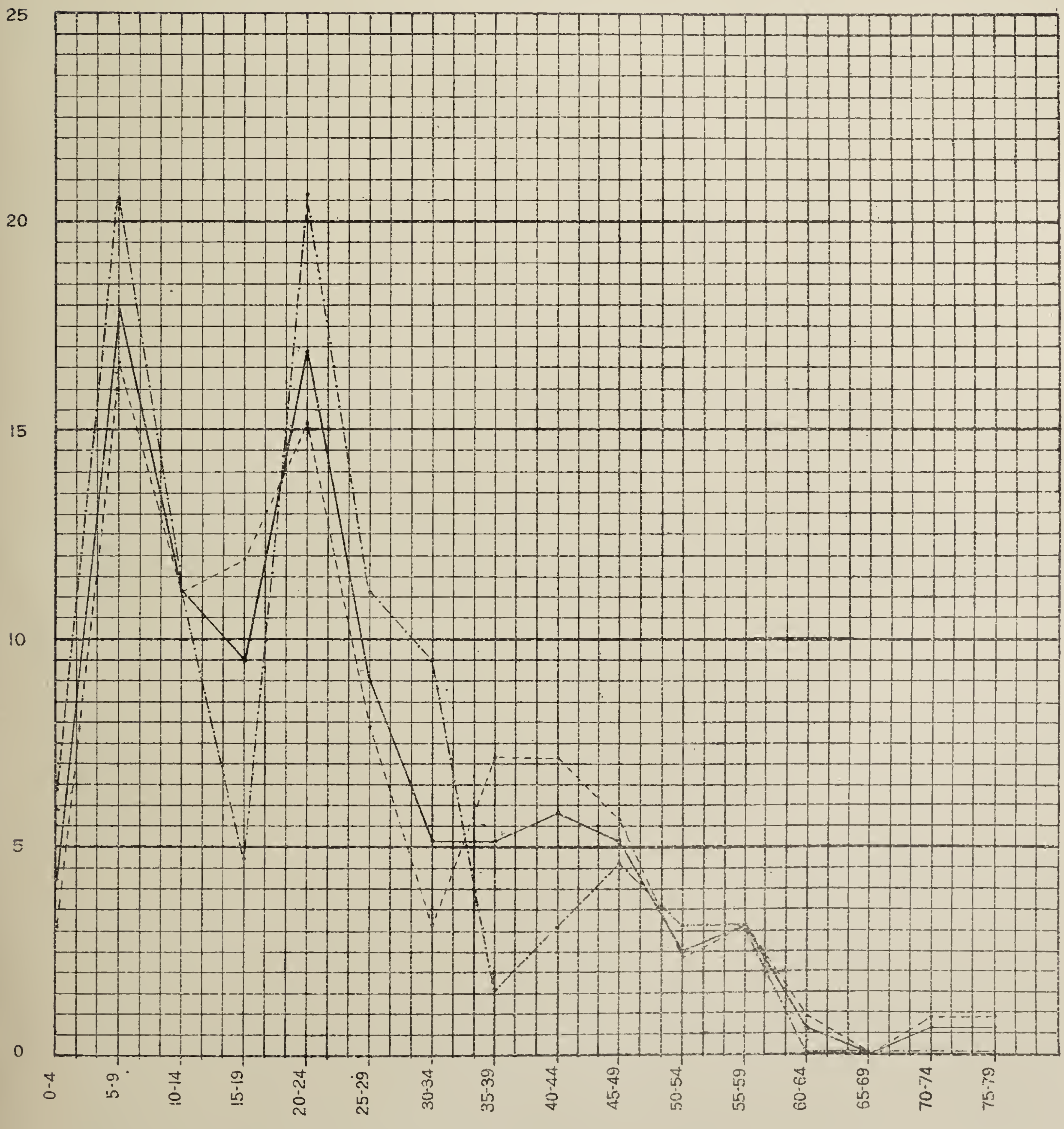
TABLE IV.—Showing case mortality of typhoid fever, New South Wales, 1913-1925.

Year.	Cases.	Deaths.	Percentage.	Year.	Cases.	Deaths.	Percentage.
1913	2,187	236	10·7	1920	1,016	132	13
1914	2,284	250	10·9	1921	949	129	13·5
1915	1,941	219	11·2	1922	706	99	14
1916	1,742	209	11·9	1923	873	104	11·9
1917	1,091	103	9·4	1924	768	97	12·6
1918	810	112	13·8	1925	533	80	15
1919	857	106	12·3				

Graph showing age incidence of Typhoid Fever cases at Broken Hill and Remainder of State (exclusive of the Metropolitan and Hunter River Combined Sanitary Districts) for the six months 1st January to 30th June, 1925.

Broken Hill	—·—·—·—·—
Remainder of State inclusive of Broken Hill	———
„ „ „ exclusive „ „ „	-------

These figures represent cases of Typhoid of each age group expressed as percentages of total Typhoid in district.



VENEREAL DISEASES ACT, 1918. (5th Report.)

REPORT BY THE COMMISSIONER, Dr. ROBERT DICK, FOR THE YEAR ENDED 31st December, 1925.

The total number of cases of venereal disease notified under the abovenamed Act during 1925 was 5,314, or 776 less than in 1924, in which year 6,090 cases were notified.

In 1925 the notifications comprised—syphilis, 1,015 cases (males 762, females 253); gonorrhœa, 3,933 cases (males, 3,584; females 349); other forms of venereal disease, 366. The proportion of males to females suffering from gonorrhœa and syphilis respectively was 10·27 to 1 for gonorrhœa; and 3 to 1 for syphilis. These ratios have remained practically without alteration for several years; and the disparity in the incidence of gonorrhœa in females corresponds to the experience in other countries where notification is not in force.

The number of persons reported for failure to continue under treatment until cured was 955, or 399 fewer than in 1924. In 538 cases (55 per cent.) it was found that the patient could not be traced at the address furnished. Of the remaining cases, 241 patients were induced to resume treatment, and 176 cases were under investigation at the end of the year.

The reduction which has taken place in the annual total of notifications during the period 1st December, 1920, to 31st December, 1925, is shown in Table I below.

Table I.

Year.	Cases Notified.			Total.	Cases Reported for Failure to Continue Treatment.			
	Syphilis.	Gonorrhœa.	Other Venereal Diseases.		Total No. Reported.	Letters Returned Undelivered.	Treatment Resumed.	Cases not Finalised at 31 Dec.
1920 (December only).	683	1,340	215	2,238	....	....	.....	.....
1921	2,055	6,667	683	9,405	2,472	1,286	906	280
1922	1,270	4,516	512	6,298	1,992	997	628	367
1923	1,240	5,115	474	6,829	1,749	964	545	240
1924	968	4,628	494	6,090	1,354	651	422	281
1925	1,015	3,933	366	5,314	955	538	241	176

In 1924 notifications were received from 341 medical practitioners, while in 1925 notifying medical practitioners numbered only 298.

Clinics—Metropolitan District.—An addition to these facilities was provided about the middle of the year in the form of a night clinic at the Coast Hospital for male syphilitic cases. There are at present eight clinics at which treatment is provided for venereal disease cases in the metropolitan district. The accommodation available at several of these clinics is not at all as satisfactory as it should be. The numbers to be dealt with at any one session are too large, and the sessions are not frequent enough. The difficulties in this connection at one of the large clinics were overcome to some extent by arranging the sessions for syphilitic and gonorrhœal patients on different evenings. The ordinary out-patient department at which some of the clinics are carried on have not been suitably planned in the first instance to allow large numbers of this class of patient to be dealt with in a satisfactory and expeditious manner. Endeavour was made to hold an additional evening session for gonorrhœa cases at one of the large clinics, but satisfactory arrangements could not be made with the hospital authorities. The need for a continuous clinic in the metropolis is keenly felt, and until this is provided the present unsatisfactory arrangements must continue.

The need for increased clinic facilities for dealing with females suffering from venereal disease still presses for attention. The clinic conducted at the Rachel Forster Hospital is proving very useful, but owing to the limited accommodation and staff available it has been impossible to deal with a larger number of cases. A scheme providing for a continuous clinic for females at this hospital has been sanctioned by the Minister for Health, and it is expected that the necessary alterations and additions to the premises will be made during the coming year. It is proposed that female medical officers of this department will supervise this clinic, which will operate continuously.

Inquiries were made at two of the large maternity hospitals in the metropolitan area as regards the steps taken to ascertain the presence of syphilitic infection amongst the patients attending the pre-maternity departments prior to their confinements. It was learned that no special steps were taken in this connection. In order that some idea of the prevalence of syphilitic infection amongst this very important section of the population might be obtained the department offered to carry out the necessary testing of a suitable number of patients. The authorities of one hospital agreed to co-operate with the department, but then only in a series of about 100 cases. The tests made showed that 8 per cent. of these prospective mothers gave positive serological evidence of syphilitic infection. Apart from the routine tests on maternity patients a small number of examinations were made during the year on suspected cases of syphilis in this hospital. In several instances a positive diagnosis of syphilis in the patient was made post-natally as a result of syphilitic manifestations in the infant. Failure to detect the condition in time to institute ante-natal treatment is to be deplored. The result of these tests proves—if proof were needed—that this subject should receive the closest attention by those who undertake the care and supervision of pre-maternity patients, for it need hardly be pointed out that the seriousness of this question does not merely concern the mother, but also her offspring.

Newcastle District.—This important and populous centre has not yet been provided with proper facilities for the treatment of venereal disease. The Newcastle Hospital authorities have been pressing for the provision of the necessary accommodation, and the Commonwealth authorities are also interested in the matter. Plans are being prepared for a building which will contain a modern clinic for venereal disease purposes and also other necessary accommodation for some other hospital activities. The report of the Medical Officer of Health for the District (page 114) indicates the extreme urgency of this clinic.

Prevention.—The posters and pamphlets issued by this Department have been revised and distributed as widely as circumstances allow. Steps have been taken to obtain a number of cinema films dealing with the venereal disease problem, and it is expected these will be available at no distant date. It is recognised that a great deal of work is needed on the educational side, if any substantial improvement is to be brought about in the prevalence of these diseases. In this State there are, so far as is known, no active agencies corresponding to the British Social Hygiene Council of Great Britain, which takes a very active part in educating the public on the perils and dangers of venereal disease, &c. Amongst the main aims and objects of this organisation are :—To promote the prevention and treatment of venereal disease by appropriate administrative, medical and social measures ; to promote the removal of conditions conducing to promiscuity ; to further social customs which promote a high and equal standard of sex conduct in men and women. An organisation actively engaged on such a purpose in this State could undoubtedly achieve a vast amount of good. The Federal Royal Commission on Health, in its report issued in 1925, recommended that the amount of subsidy granted by the Commonwealth for venereal disease should be substantially increased and that more clinics should be established in the larger centres. If increased money were made available the work now undertaken by this State could proportionally be extended in the direction of providing more clinics and in carrying on a wider and more intensive educational campaign.

Expenditure, 1925.—£4,945 was spent from the special appropriation of £5,000 for expenses under the Venereal Diseases Act. Of this amount £3,175 was paid in grants to public hospitals towards cost of special accommodation for the treatment of venereal diseases, and £1,438 for drugs supplied free by this department to public hospitals for the treatment of these complaints.

In addition to these sums considerable amounts are expended in the treatment at public hospitals of patients suffering from venereal diseases. At the Coast Hospital, and at Liverpool and Newington State Hospitals and Asylums wards are set apart for venereal cases. The cost of maintenance in 1925 of the beds at these institutions occupied by patients suffering from venereal diseases amounted to £8,770.

Pathological Examinations.—Laboratory examinations required in connection with the diagnosis and treatment of venereal diseases are carried out free of charge in the microbiological laboratory of the department. A reference to Table VI will show the greatly increased use made of this service, more especially during the past two years, as medical practitioners find the tests very helpful in checking the results of treatment.

Prosecutions.—Proceedings undertaken for breaches of the Act were as under :—

1. *Advertising cure of certain diseases, &c.*—Under Section 25 there were two successful prosecutions for having advertised (by pamphlet) the sale of a tonic claimed to be "a remedy for nervous and sexual disability." Fines were imposed in each case.
2. *Failure to place under treatment.*—Action was taken under Section 4 against a girl of 18 years suffering from venereal disease for failing to place herself under treatment. A sentence of two months' light labour was imposed.

Tables II to VII show the number and distribution of notified cases ; age and sex incidence ; diagnostic examinations made, summary of clinic attendances, &c.

TABLE II.—Notifications received 1923-1924-1925 from Public Hospitals and Private Practitioners.

	Public Hospitals.			Private Practitioners.		
	1923.	1924.	1925.	1923.	1924.	1925.
Gonorrhœa	2,925	2,196	2,450	2,190	2,432	1,483
Syphilis	969	751	829	271	217	186
Other forms of Venereal Disease	278	240	53	196	254	313
	4,172	3,187	3,332	2,657	2,903	1,982

TABLE III.—Notifications received during 1923-1924-1925 arranged in order of districts.

	Metropolitan Area.			Newcastle District.			Remainder of State.		
	1923.	1924.	1925.	1923.	1924.	1925.	1923.	1924.	1925.
Gonorrhœa	4,774	4,313	3,611	43	42	96	298	273	226
Syphilis	1,162	896	968	36	33	25	42	39	22
Soft chancre	95	74	42	2	......	......	3	2	1
Gleet	330	577	290	11	......	......	6	9	5
Gonorrhœal warts	16	17	20	......	......	1	1	......	......
Gonorrhœal ophthalmia	2	5	1	......	......	1	......	1	3
Venereal granuloma	8	9	......	......	......	1	......	......	1
Total	6,387	6,090	4,932	92	75	124	350	324	258

TABLE IV.—Return of cases of Venereal Disease notified during 1925, showing forms of disease, and age and sex of patients.

	0 to 5.		6 to 10.		11 to 15.		16 to 20.		21 to 25.		26 to 30.		31 to 35.		36 to 40.		40 to 45.		46 to 50.		Over 50.		Age not stated.		Total.		Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	
Gonorrhœa	1	24	2	15	17	22	544	92	993	71	786	54	563	35	331	16	165	8	76	7	85	4	21	1	3,584	349	3,933
Syphilis	14	18	7	12	3	9	49	28	115	42	122	39	136	42	91	25	79	14	45	15	93	9	8	...	762	253	1,015
Soft chancre	...	...	...	...	...	...	6	...	9	...	13	...	5	...	2	...	3	...	1	...	4	...	...	...	43	...	43
Gleet	...	...	...	...	...	...	4	...	61	...	90	...	68		41	...	24	...	5	...	2	...	...	...	295	...	295
Venereal warts	...	...	...	...	...	...	1	...	7	...	7	1	1	...	1	...	2	...	1	...	...	...	...	...	20	1	21
Gonorrhœal ophthalmia	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	4	5
Venereal granuloma	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...		...	...	...	2	...	2
	15	46	9	27	20	31	604	120	1,186	113	1,018	94	773	77	466	41	273	22	128	22	185	13	30	1	4,707	607	5,314

TABLE V.—Monthly return of cases of Venereal Disease notified during 1925.

		Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		
Gonorrhœa	Male	275	354	324	323	258	274	302	264	325	327	283	275	3,584	3,933
	Female	36	20	16	17	32	16	22	33	43	26	52	36	349	
Syphilis	Male	57	51	85	52	76	55	71	74	54	64	60	63	762	1,015
	Female	14	11	22	21	36	37	12	20	21	20	14	25	253	
Soft chancre	Male	8	1	5	2	3	4	1	9	1	2	4	3	43	43
	Female	...	...	...	...	...	...	...	...	...	...	...	...	...	
Gleet	Male	21	23	34	29	22	12	32	14	18	42	36	12	295	295
	Female	...	...	...	...	...	...	...	...	...	...	...	...	...	
Venereal warts	Male	2	3	...	...	1	2	3	5	3	1	...	...	20	21
	Female	...	...	...	...	...	...	...	...	...	1	...	...	1	
Gonorrhœal ophthalmia	Male	...	...	...	...	...	...	...	...	...	...	...	1	1	5
	Female	...	1	1	...	...	...	...	1	...	1	...	...	4	
Venereal granuloma	Male	...	...	1	1	...	...	...	...	...	...	...	...	2	2
	Female	...	...	...	...	...	...	...	...	...	...	...	...	...	
		413	464	488	445	428	400	443	420	465	484	449	415	4,707 607	5,314

TABLE VI.—Diagnostic examinations for Venereal Diseases made in the Microbiological Laboratory during the years 1920–1925.

Year.	Gonorrhœa. (Smears and Urine.)	Gonorrhœa. (Complement (Deviation Test).	Syphilis. (Wassermann Reaction).	Syphilis. (Kahn's test).	Syphilis. (Smears for Spirochætes).
1920	1,012	......	2,270	......	......
1921	2,196	......	2,488	......	......
1922	1,981	......	2,537	......	22
1923	1,919	......	2,431	......	25
1924	2,261	1,265	3,674	......	10
1925	2,487	1,585	5,186	2,060	16

TABLE VII.—Summary of Annual Attendance Returns at Public Clinics for treatment of Venereal Diseases, 1920–1925.

Year Ended.	Attendances.			New Cases.					
				Gonorrhœa.			Syphilis.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
				Royal Prince Alfred Hospital.					
31 December, 1920	3,147	1,031	4,178	62	21	83	33	31	64
31 " 1921	15,420	4,303	19,723	337	139	476	156	94	250
31 " 1922	17,298	4,498	21,796	523	129	652	235	101	336
31 " 1923	20,043	4,141	24,184	603	140	743	186	111	297
31 " 1924	20,993	4,880	25,873	657	146	803	219	111	330
31 " 1925	21,242	4,915	26,157	558	119	677	137	80	217
				Sydney Hospital.					
31 December, 1920	2,061	207	2,268	222	...	222	94	14	108
31 " 1921	15,565	1,120	14,685	1,335	...	1,335	420	52	472
31 " 1922	12,385	493	12,878	1,154	...	1,154	244	12	256
31 " 1923	15,265	2,277	17,542	1,412	80	1,492	304	68	372
31 " 1924	13,829	2,863	16,692	719	45	764	233	93	326
31 " 1925	12,896	2,527	15,423	972	51	1,023	204	60	264
				Royal Alexandra Hospital for Children.					
31 December, 1920	Returns not available.								
31 " 1921									
31 " 1922	...	...	4,143	2	33	35	23	18	41
31 " 1923	...	...	4,284	...	41	41	22	23	45
31 " 1924	469	2,000	2,469	3	25	28	19	16	35
31 " 1925	333	1,742	2,075	......	25	25	20	17	37
				Royal South Sydney Hospital.					
31 December, 1920	Returns not available.								
31 " 1921									
31 " 1922	2,049	2	2,051	123	...	123	17	1	18
31 " 1923	1,958	21	1,979	127	...	127	23	2	25
31 " 1924	1,787	35	1,822	121	...	121	36	6	42
31 " 1925	2,355	......	2,355	125	...	125	30	...	30
				Royal North Shore Hospital.					
31 December, 1920	Clinic first opened in August, 1922.								
31 " 1921									
31 " 1922	67	18	85	5	...	5	3	9	12
31 " 1923	563	366	929	60	...	60	5	15	20
31 " 1924	2,663	375	3,038	91	9	100	11	17	28
31 " 1925	3,365	707	4,072	88	7	95	9	9	18
				Coast Hospital Night Clinics for Syphilis (Men only).					
				1. Hospital admission Depôt, Head Office (Coast Hospital Staff).					
	Clinic first opened in August, 1924.								
12th August to 31st December, 1924	1,290	...	1,290	...	...	...	229	...	229
31st December, 1925	6,704	...	6,704	...	...	...	595	...	595
				2. *Coast Hospital, Little Bay.*					
	Clinic first opened 29th June, 1925.								
29th June to 31st December, 1925	699	...	699	...	...	...	Information not available.		
				Rachel Forster Hospital for Women and Children.					
	Clinic first opened in 1923.								
31 December, 1924	...	1,000	1,000	...	73	73	...	33	33
31 " 1925	...	1,615	1,615	...	74	74	...	15	15

SECTION I.—C.

Industrial Hygiene.

Medical Officer of Industrial Hygiene—CHARLES BADHAM, B.Sc., M.B., Ch.M., D.P.H.
Engineer Assistant—C. F. ASSHETON, B.E.

STUDIES IN INDUSTRIAL HYGIENE.

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*Serial No. 1.—Textile Industry, Sydney, New South Wales, Investigation into the Health and Factory Conditions of certain Textile Workers. Ann. Rept., Dir.-Gen. Pub. Health, 1923. p. 27.

2.—An Investigation concerning the Ventilation and Sandstone Dust present in the Air of certain Sewer Tunnels under Construction at North Shore, and in other Sandstone Workings. Ann. Rept., Dir.-Gen. Pub. Health, 1924, p. 52.

3.—An Investigation concerning the Health of the Employees and the Ventilation in certain Wine Cellars... ,, ,, p. 65.

4.—An Investigation concerning the Working Conditions and Health of Quarrymen in certain Government Quarries in New South Wales. ,, ,, p. 69.

5.—An Investigation into the Sandstone Dust Hazard among Miners, Quarrymen, and Stonemasons in New South Wales. ,, ,, p. 76.

6.—An Investigation concerning the Incidence of Lead Poisoning in Motor-car Painters .... ,, ,, p. 90.

Studies in Industrial Hygiene, No. 7.

LEAD POISONING.

Concerning the standards which should be used in diagnosing this Industrial disease, together with a new method for the determination of lead in urine.

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Introduction.

"*Pathological opinion in regard to the relation of kidney lesion and lead poisoning has been too stereotyped.*"—*Oliver*, 1891.

Our knowledge concerning lead poisoning has during the past few years advanced, and the chief contributors to our increasing information are American authors, principally of the Harvard School of Public Health. One has but to cite the work of Harris; Hamilton, Newman, McConnell, Spencer, Phillips; Aub, Fairhall, Minot, Reznikoff; Blumgart, and of the Committee of the U.S. Public Health Service, dealing with lead tetraethyl to show how in this field of medicine distinguished by the work of Oliver, Legge and Goadby, the chief research is being done by the Americans.

Quite apart from the scientific interest which attaches to the interesting pathological changes that lead poisoning produces in humans, from a medico-legal standpoint there are many problems associated with it, and these chiefly centre round the standards which may properly be employed to diagnose lead poisoning.

It is proposed to make a review of certain standards that have been adopted, and to propose standards which we think are equitable and to give details of a series of cases of suspected lead poisoning which have come before one of us for certification, during the period March, 1925, to July, 1926, in his official capacity as Certifying Surgeon for the Metropolitan Area under the Workmen's Compensation Act of New South Wales, 1916.

So far as opportunity served, these cases have been investigated with what resources were available, and although the intentions to make an intensive study of each case (1) have frequently been thwarted, still there remains a measure of results which we think worth recording as a practical illustration of the difficulty which any industrial physician will meet when he undertakes to diagnose a case of suspected lead poisoning.

It will be seen that we have been influenced by the work of Aub and his colleagues (2), and that we have attempted to apply practically certain of the principles of their work, but lacking assistance and hospital accommodation for our patients our results are inconclusive. Moreover, the discovery of a normal excretion of lead renders the problem more obscure.

We will in subsequent sections discuss one fact which we regard as of great importance to the general practitioner in diagnosing lead poisoning. In those cases in which the exposure to lead is quite recent (*i.e.*, within a few days in mild cases of poisoning) the diagnosis of lead poisoning may be easily verified from the blood smear carefully stained by Giemsa or Methylene blue solution, and the intensity of the basophil degeneration of the red cells will frequently enable him to judge the intake of lead and to correlate this with the symptoms of the patient. *Appendix* 4.

The chief concern of the industrial physician in these days is found not in the diagnosis of the early stages of lead poisoning, but in endeavouring to gain knowledge concerning the causes of the late stages of a presumptive chronic lead poisoning, when the characteristic degenerative changes of arteriosclerosis and nephritis may require considerable investigation to correlate with work in a lead trade. Even this delving into conditions of work, earlier signs and symptoms, and statistical proof, may fail to clarify the position, and one is tempted to adopt standards of expediency which will not err in penalising an industry. Such standards will be to the disadvantage of some who may well lament their misfortune lacking their compensation by reason of the want of medical knowledge concerning the causes of arteriosclerosis and nephritis among the community.

An example of such a standard of expediency in the diagnosis of arteriosclerosis and nephritis resulting from chronic lead poisoning was that adopted by the Technical Commission at Broken Hill in 1921. No man was considered as having acquired these degenerative conditions from exposure to lead unless he gave a clear-cut past or present history of typical colic or of a typical palsy. Many of these men had been exposed to carbonate ores in their early days followed by a daily dose of sulphide of lead, estimated to have been between 1 and 2 mgms. Having adopted this strict standard, which receives little support from European authorities, one of these authors four years later sought evidence to justify his views from the statistics concerning arteriosclerosis and nephritis among sandstone workers, but this data will fail to satisfy other investigators.

While mentioning this point one might quote Apfelbach (3), who, writing of 1,000 cases of lead poisoning, says—" Since more lead workers suffer from vague abdominal pains and gastric disturbances than from colic, a differential diagnosis of any abdominal pain or colic or gastric disturbance demands a consideration of lead as a possible cause."

Meillere remarked in 1910, " that not only workmen but physicians often refuse to recognise anything as lead poisoning except colic or palsy, as sensible, as to say alcoholism always means delirium tremens."

The uninspired Workmen's Compensation Act of New South Wales of 1916 copied the English Act and made *lead poisoning or its sequelae* compensatable. The legal point is that lead poisoning must be proved before the sequelæ could be assumed to be related to lead. This in itself was sufficiently bad from a medical point of view, for few medical men believed that the chronic poisoning which might produce a nephritis must perforce reveal its attack by some severe symptom, but the Broken Hill investigators went even further and demanded nothing less than an attack of colic or palsy before the arteriosclerosis or nephritis of the Broken Hill men could be assumed to be related to lead poisoning. It is, indeed, difficult to understand why Chapman and Smith applied these views in the Broken Hill investigation. How, one asks, could they afford to ignore the opinion of the great English authorities to whom they so often turned for guidance. Legge and Goadby, writing in 1912, said—" Unless it were established that granular nephritis were present in a lead-worker before commencement of lead employment, we think it would be useless to endeavour to prove that the condition was independent of lead despite its comparative frequency as a cause of death apart from employment."

In Australia the chief contributors to our knowledge of lead poisoning have been the Queensland workers, who have investigated lead poisoning in children which has such a grave incidence in that State. The work of Brienl and Young (4) of the Townsville Institute of Tropical Medicine, published in 1914, forms a classic model of how such an investigation should be described.

Lockhart Gibson described the high incidence of papilloedema in children poisoned by lead, and with his colleagues placed on record the special characteristics of the disease among children.

In the following sections a brief review is given of the more recent work and ideas concerning the pathology and bio-chemistry of lead poisoning. A new method for the chemical analysis of lead in urine is detailed, and from the facts given it is hoped that the signal advantage, which it has proved in our hands in the investigation of numerous cases of suspected lead poisoning, has been clearly set forth, and that it may in the hands of other workers prove as useful and accurate.

A point which we think of considerable interest is the fact that we believe that our investigations have demonstrated that there is an excretion of lead in the urine of practically all individuals resident in Sydney. This excretion, which approaches the infinitesimal, is of the same order as the excretion of arsenic, and copper, and is generally about ·02 mgm. per litre of urine.

We found also that there is an excretion of lead in the fæces of " normal " individuals and the American Tetraethyl Lead Committee has quite recently published similar observations. These facts have made it difficult for us to apply the findings of Aub and his colleagues to our patients when testing for storage of lead by means of the administration of ammonium chloride and a calcium free diet.

A criticism is given of S. A. Smith's attempt to show statistically that arteriosclerosis and nephritis do not originate from the effects of lead, among lead workers, in the absence of a toxic episode (colic, palsy, encephalopathy). A statistical note by Mr. D. T. Sawkins, M.A., F.S.S., on certain figures published by S. A. Smith concerning Broken Hill miners is given in Appendix 5. A tabulation is given of the details of suspected cases of lead poisoning investigated by us and of an examination of a group of thirty-three workers in an accumulator factory where the management ignored the hygienic measures of exhaust ventilation and suction cleaning and pinned their faith to gloves and an anti-cigarette campaign. Following an epidemic of lead poisoning we made a status examination of the employees with the result that fourteen of them were found to have mild lead poisoning. Of these thirty-three the urine of fourteen showed the presence of granular casts while stippled cells were found in the blood smears of thirty men. *Appendix* 3.

To render this account of more use to medical practitioners short notes on the signs and symptoms of lead poisoning have been given. Comments on the abuse of the term "lead absorption" have been given in an earlier paper. It is a term which is suspect by industrial hygienists and might well be dropped.

Our thanks are tendered to Drs. E. W. Ferguson, E. L. Morgan and Elsie Dalyell and to Miss Pinkerton, B.Sc., and Mr. C. F. Assheton, B.E. for their active assistance in the examinations of tissues, urines and bloods.

In conclusion we wish to thank the authorities on Industrial Hygiene of various countries by whose works we have profited for the kindly reception that has been given to our earlier studies.

SECTION 1.—THE DETERMINATION OF LEAD IN URINE AND FAECES.

Many methods both electrolytic and chemical have been advanced from time to time for the determination of small quantities of lead in biological material. They have for the most part followed the general procedure of ashing to destroy the organic matter, dissolving the ash in hydrochloric acid and separating the lead as a sulphide by means of hydrogen sulphide, the lead being finally determined electrolytically as metallic lead or lead dioxide and chemically as the sulphate or chromate.

Recently a distinct advance has been made by Fairhall (5) in the examination of urine for lead. He found that when a urine is made sufficiently alkaline by the addition of sodium or ammonium hydrate to precipitate the phosphates, practically the whole of the lead is carried down with the precipitate. He considered that lead is present in urine as a highly dispersed colloidal phosphate and is carried down by entrainment with the precipitated phosphates. This explanation may be correct when the amount of lead present is greater than the solubility of lead phosphate in urine under these conditions, but since all of the lead phosphates have a definite solubility, even in solutions containing other phosphates, it is doubtful whether the entrainment theory is correct for the precipitation of the very small quantities of lead found in urine. If a solution of an oxalate is added to a sample of urine previously made acid with acetic acid a precipitate of calcium oxalate forms which carries down with it the whole of the lead present. According to Fairhall it would appear since the oxalate and phosphate precipitates act in the same manner, that the addition of acetic acid has in no way changed the physical character of the lead and that it still exists as a highly dispersed phosphate. An assumption which is highly improbable. Should the lead be present in this form then the addition of a small amount of sodium hydrate in excess of that required to precipitate the phosphates would in all probability have no effect on the precipitation of the lead. This is, however, not so, for as will be seen in the following Table the amount of lead precipitate decreases as the alkalinity of the solution increases. It would appear therefore that there are good grounds for doubting the statement that lead exists in urine as a highly dispersed phosphate, and it is considered that some other explanation for the precipitation of the lead is needed.

The figures given in Table I, below, are for the same sample of urine, to 1 litre portions of which, were added various amounts of sodium hydrate. The phosphate precipitates formed were freed from urine by decantation and finally by filtration, ashed and the amount of lead they contained determined by dissolving the ash in hydrochloric acid and proceeding as given later for the determination of lead in fæces. Another portion of this sample analysed by the oxalate method for the determination of lead in urine (which is described later) gave a lead content of 0·09 mgm. per litre. The difference between this figure of 0·09 mgm. and the amounts of lead found as given in column 3, represent the loss of lead due to the increased concentration of sodium hydrate. To prove conclusively that lead is lost in this way 1,000 c.c. of the alkaline urine decanted from portions 2 and 3 (500 c.c. of each portion) were taken and the lead content determined by the oxalate method. The analysis showed that 0·04 mgm. of lead had been left in solution and it is interesting to note that this figure is the mean of the lead lost from these two portions as shown in the last column of the Table.

TABLE I.

	Volume of Urine.	Sodium Hydrate added	Lead found.	Lead lost.
	c.c.	grm.	mgm.	mgm.
1	1,000	1·1	0·08	0·01
2	1,000	3·0	0·06	0·03
3	1,000	7·5	0·04	0·05

Fairhall (2) has himself shown in Table II that lead can be removed from solution by such substances as ignited bone and kelp charcoal provided the solution is of suitable hydrogen ion concentration. This phenomenon is clearly one of adsorption and is in our opinion the explanation of the removal of small quantities of lead from urine by phosphate and oxalate precipitates.

TABLE II.

Medicine Monographs, Vol. VII.—Lead Poisoning, p. 40)

Lead in Solution.	Lead in Solution.	
	Ignited bone.	Kelp charcoal.
mgm.	mgm.	mgm.
25	0·00	4·77
50	0·00	20·45
75	0·00	40·12
100	0·77	56·06
125	2·96	....
150	11·03	90·71
200	19·42	....

In Table II it is seen that the adsorption of lead from a solution of lead chloride by the kelp charcoal is considerably less than that by the ignited bone. From a consideration of the two materials this is, however, what would be expected. In the case of the charcoal as the lead is adsorbed the acidity of the solution increases which has the effect of decreasing the rate of adsorption (since the rate of adsorption is dependent on hydrogen ion concentration). With ignited bone the increase of acidity due to adsorption of lead is at once neutralised by calcium from the bone going into solution with the result that in this case the adsorption of lead proceeds at approximately a constant rate and does not decrease as in the case of the charcoal.

The accuracy of any method for the determination of small quantities of lead must necessarily depend on the amount of lead lost and gained during the analysis. These amounts, although actually very small, are relatively large when the total amount of lead present in the material is taken into consideration. The most satisfactory method would, therefore, appear to be one in which the number of stages in the analysis and the quantities of the reagents used are reduced to a minimum. It is obvious that lead cannot be precipitated from a solution when the amount present is less than the solubility of the lead salt to be formed but as has been shown it is possible to remove these small amounts by adsorption with suitable material either added or formed in the solution. It has been found that calcium oxalate is a particularly suitable material for the adsorption of lead from urine and moreover, by its use the separation by means of hydrogen sulphide is obviated. Although in the initial stages of an analysis it is possible to precipitate even the smallest trace of lead from a sample of urine, this fact is of little value unless the methods adopted in the subsequent stages are of equal accuracy. Volumetric methods for the final lead determination, such as the titration of the iodine liberated from potassium iodine by lead chromate in acid solution are of little value in the determination of quantities of lead less than 0·05 mgm. on account of the experimental error being of approximately the same value. It therefore seems advisable to select some colorimetric method.

Ivanov (6) has investigated the reaction which takes place when a solution of an acid sulphite is added to a solution of a lead salt and found that a turbidity was produced in proportion to the amount of lead present at concentrations of not less than one part of lead in 2,000,000. This reaction has been subjected to further investigation and has proved entirely satisfactory for the conditions under which it has been applied.

Lead Content of Normal Persons.—Small amounts of lead have been found by various workers in the fæces of persons not associated with lead in their daily work (report of the Commission on Tetraethyl lead (7)) but no reference has been made to the presence of lead in the urine of such persons. With the methods which have been used for this investigation and which are given in detail, the presence of lead in the fæces of normal persons is confirmed and ranged in the specimens examined from 0·05 mgm. to 0·43 mgm. per 100 gramme of fæces. It has also been possible to show quite conclusively that there is, as would be expected, a lead content of normal urine ranging from 0·005 mgm. to 0·04 mgm. per litre.

A NEW METHOD FOR THE DETERMINATION OF LEAD IN URINE AND FÆCES.

In putting forward the following new method for the determination of lead in urine, the following advantages are claimed :—

1. *Ease of manipulation.*—The oxalate precipitate lends itself to easy filtration, eliminates the separation of the lead by hydrogen sulphide and consequently effects a great saving in the time required for an analysis.
2. *Loss of Lead.*—Both the number of stages in the analysis and the amounts of reagents used are reduced to a minimum which practically eliminates any loss of lead through solubility.
3. *Accuracy.*—It is possible by this method to accurately determine as small an amount of lead as 0·005 mgm. per litre of urine. This amount of lead is considerably smaller than that able to be determined by any method previously advanced.
4. *Final Lead Determination.*—The determination of the lead is finally made by means of the sulphite reaction.

In connection with the determination of lead in fæces the following improvements have been incorporated :—

1. The addition of a small amount of lime in order to accelerate the ashing process, and which also enables the organic matter to be burnt off at a much lower temperature.
2. The final determination of the lead is carried out by means of the sulphite reaction described by Ivanov.

Collection of Samples.—The samples of urine were collected in bottles of two to three litres capacity containing 10 c.c. of redistilled chloroform. By this means the samples were always in good condition when received at the laboratory and could be kept for any desired period.

Reagents and their Purification.—Reagents used were—

1. Hydrochloric acid.
2. Acetic acid.
3. Sodium Hydrate.
4. Ammonium oxalate (saturated solution).
5. Calcium chloride (5 % solution).
6. Sodium-bi-sulphite (10 % solution).
7. Chloroform.
8. Distilled water.

Of these reagents the hydrochloric acid and sodium hydrate were found to be lead free in the quantities used and required no purification. The acetic acid and chloroform were obtained lead free by redistillation. The saturated solution of ammonium oxalate was made neutral to methyl red, boiled, and the lead completely removed by the addition of ignited bone, and subsequent filtration. The calcium chloride solution was freed from lead in the same manner as the ammonium oxalate. The solution of sodium-bi-sulphite was rendered lead free by filtration until clear. The distilled water was procured lead free by distillation from glass vessels. All filter papers contained a small amount of lead which was, however, readily removed by washing with diluted hydrochloric acid and distilled water.

Method of Analysis.—The efficiency of this method depends to a very large extent on the close attention to details which have therefore been given very fully:—

(1) To 1,000 c.c. of urine are added 2 c.c. 1·1 acetic acid, 5 c.c. of 5 per cent. calcium chloride and 25 c.c. of a saturated solution of ammonium oxalate, the contents of the beaker being well mixed after each addition.

(2) After standing all night the precipitate of calcium oxalate is separated from the greater portion of the urine by decantation.

(3) The beaker containing the precipitate and about 20 c.c. of urine is heated on the water bath for about 5 min. or until the precipitate becomes granular.

(4) The precipitate is then separated from the liquid by passing through a 9 c.m. filter and the contents of the filter washed once with distilled water.

(5) The precipitate is then transferred to a small platinum dish by making a hole in the bottom of the filter and washing out with a jet of water. After the addition of 1 c.c. Hydrochloric acid (conc.) the contents of the dish are evaporated to dryness on the water bath.

(6) The dish is then heated over a small rose burner until the whole of the calcium oxalate is converted into carbonate. In this operation care must be taken that the temperature of the dish is raised sufficiently high to bring about the complete decomposition of the oxalate, and yet not high enough to cause loss of lead through over-heating. In practice it is found that good results are obtained by placing a small piece of platinum foil over the dish when complete conversion of oxalate will take place in about one hour, at a temperature just below dull redness.

(7) 2 c.c. of hydrochloric acid (conc.) are then added to the dish to convert the carbonate into chloride, evaporated on a water bath, and finally brought to dryness by heating over a small burner.

(8) 5 c.c. of distilled water are then added to the dish and 3–4 drops of approximately 1 : 10 hydrochloric acid, in order to dissolve any calcium oxide formed.

(9) The solution is then made just alkaline to methyl red with approximately 1 : 30 sodium hydrate, and filtered through a 7 cm. filter, the dish is washed out with the filtrate, and the contents of the filter washed once with distilled water. The lead at this stage is on the filter paper.

(10) The filter paper is then treated in the filter funnel with 2 c.c. 1 : 10 hydrochloric acid, and the paper washed with small quantities of distilled water until the filtrate totals 7·5 c.c.

(11) A solution of sodium hydrate approximately 1 : 30 is then added to the filtrate until it is just acid to methyl orange. The filtrate is then re-passed through the filter, made up to 10 c.c. by washing the filter paper with small quantities of water, and again adjusted so that it is faintly acid to methyl orange.

The amount of lead present is then determined by comparing the turbidity produced on the addition of 1 c.c. of a 10 per cent. solution of sodium-bi-sulphite to 5 c.c. of the filtrate, with that of standards containing known amounts of lead. The standard solutions are made up so that they contain approximately the same amount of sodium chloride as the filtrate to be tested. This is important since the presence of a salt, such as sodium chloride, affects the physical character of the precipitate of lead sulphite. This standard salt solution contains approximately 12 grms. of sodium chloride to a litre and is adjusted so that it is just acid to methyl orange.

The determination is carried out as follows:—To six test tubes ½ in. x 5 in. are added amounts of lead from ·005, ·01–·05 mgm (i.e.) ·05 to ·50 c.c. of a solution of lead acetate (1 c.c.= ·0001 gm lead) and 5 c.c. of the standard salt solution. The contents of the tubes are mixed and to each is added 1 c.c. of a 10 per cent. solution of sodium-bisulphite. To 5 c.c. of the filtrate to be tested is added 1 c.c. of sodium bi-sulphite and the degree of turbidity compared with those of the standard tubes.

In the above method, should any oxalate be not converted into carbonate (stage 6 of the analysis) it will be noticed that when the calcium chloride is taken up with water and a few drops of dilute acid added (stage 8) the solution will remain slightly turbid. If the analysis is continued a precipitate of oxalate will form on neutralising with soda (stage 11), which will completely remove the lead from solution. If this happens the solution containing the precipitate should be evaporated to dryness, heated to convert the oxalate into carbonate, treated with a few drops of hydrochloric acid (concentrated), dried over a small flame, and again taken up with 5 c.c. of water, and a few drops of dilute hydrochloric acid.

Testing of Reagents for Lead.—Since as small an amount as ·0025 mgm. of lead in 5 c.c. of the final filtrate will give a definite reaction for lead, it is of extreme importance to know that no lead is picked up either from the reagents or from the containing vessel. To show that the reagents after purification were entirely free from lead, a series of experiments were conducted in which the amounts of the reagents used were varied, while the quantity of urine remained constant at a litre. These determinations proved quite conclusively that the means taken to purify the reagents had been effective.

A similar series was carried out in which the amounts of the reagents, filter paper, &c., were kept constant, while the quantity of urine varied. In these experiments quantities of urine were taken ranging from 250 c.c. to 1250 c.c., and the amount of lead found was in all cases directly proportioned to the quantity of urine taken. These experiments eliminated the possibility of contamination during the process of the analysis, but there still remained the possibility of the urine taking up lead while standing in the containing vessel. This possibility was eliminated by determining the lead content of fresh urine and of the same sample after it had stood in the containing vessel a number of days. In no case did the lead content of the urine show an increase in value. From these investigations there appears to be no doubt that the amount of lead found in a urine by the method given above, is the lead actually excreted in the urine.

The results of a few analyses of urines to which lead has been added are given in Table III.

TABLE III.

Amount of lead added. mgm.	Amount of lead found. mgm.	Amount of lead added. mgm.	Amount of lead found. mgm.	Amount of lead added. mgm.	Amount of lead found. mgm.
(1)—0·00	0·04	(2)—0·00	0·005	(3)—0·00	0·02
0·01	0·05	0·02	0·02	0·05	0·07
0·05	0·09	0·05	0·05	0·10	0·10
				0·20	0·20

The effect of Tin, Barium, and Bismuth.—Of the metals likely to be present in a sample of urine, tin, barium, and bismuth, give a reaction with sodium bi-sulphite somewhat similar to that of lead. Since their presence in the final solution (stage 11) would effect the determination of the lead, it is important to know if these metals are eliminated during the course of the analysis. To prove that both tin and barium are eliminated during the analysis 1·0 mgm. of tin chloride was added to a litre of urine and 1·0 mgm. of barium-chloride added to another litre of the same sample known to contain 0·02 mgm. of lead per litre. On analysis the amount of lead in each was found to be 0·02 mgms., showing that neither tin nor barium interfere with the lead determination.

In the case of a urine which contains bismuth, this metal separates out as the oxychloride on the final neutralisation with soda (stage 11). If this neutralisation is done in the cold the oxychloride formed carries down with it the whole of the lead, but it has been found that by neutralising when hot, practically the whole of the lead remains in solution.

The Determination of Bismuth.—Should bismuth separate out in final stage of the analysis for lead it can readily be determined as follows:—The lead free bismuth-oxy-chloride precipitate is dissolved on the filter paper with 5 c.c. of 1 : 10 hydrochloric acid. The filter is then well washed with distilled water and the volume made up to 25 c.c. The amount of bismuth present is then determined in an aliquot portion by comparing the colour produced on the addition of one drop of a 10 per cent. solution of sodium sulphide with standards containing known amounts of bismuth treated in the same manner.

The Determination of Lead in Faeces.—The procedure followed in the analysis is that usually adopted of ashing and dissolving the ash in hydrochloric acid. The separation of the lead is then effected as the sulphide, and the final determination made as the sulphite.

The details of the method are as follows:—

(1) 50-100 grm. of faeces are placed in a platinum dish and heated over a small burner until thoroughly charred.

(2) The contents of the dish are then ground to a powder, with the addition of ·5 grm. of slaked lime (lead free) and heated below dull redness until the ash becomes grey white in colour.

(3) The ash is then treated with 15 c.c. of concentrated hydrochloric and 25 c.c. of distilled water, and heated on the water bath for two hours. A clock glass should be placed over the dish to prevent evaporation. The volume is then made up to 100 c.c. and heated for another hour.

(4) The solution is then passed through a 9 cm. filter. The contents of the filter are returned to the dish by washing, evaporated to dryness, and the carbon completely burnt off below dull redness.

(5) The ash is treated with 5 c.c. hydrochloric concentrated and 10 c.c. water for 1 hour, filtered, and the filtrate added to the filtrate from (4).

(6) The filtrate is made up to 200 c.c., heated on water bath, and while hot 25 per cent. sodium hydrate added, until the solution is just acid to methyl orange.

(7) The solution is filtered, and hydrogen sulphide is passed for 10 minutes.

(8) After standing all night the precipitate is filtered off and washed twice with distilled water.

(9) The filter paper is then transferred to a small beaker, 5 c.c. of distilled water and 0·5 c.c. nitric acid (conc.) added, and heated on the water bath until the brownish precipitate is completely dissolved leaving only a small residue of sulphur. A watch glass should be placed over the beaker.

(10) The solution is then filtered, the filter paper well washed and the filtrate boiled to expel any hydrogen sulphide.

(11) Sodium hydrate (approximately 1 c.c. of 25 per cent.) is added until the solution is faintly acid to methyl orange, and the volume made up to 25 c.c.

The lead in this solution is then determined colorimetrically as previously described for the determination of lead in urine.

The precipitate which is formed in stage (6) will not contain any determinable quantity of lead, provided the solution is neutralised while hot, except when a very large quantity of bismuth is present. In that case it is necessary to dissolve the precipitate and reprecipitate from a boiling solution.

SECTION 2—TOXICITY OF LEAD AND ITS COMPOUNDS.

While all compounds of lead are toxic to humans this quality varies greatly. It may be stated in general terms that it increases with the solubility of the compound, but this solubility will differ greatly with different media. The solubility of the various compounds of lead will be considered in relation to water, gastric juice and blood serum, for the solubility in the first of these media may probably be taken to have a relation to absorption from the naso-pharynx, the second from the stomach, and the third from the lungs.

	Water. grams per litre.	Gastric Juice per cent.	Blood Serum grams per litre.
Pb.*	0·012	......	0·578
$Pb.CO_3$	0·0013	46·0	0·033
$Pb.SO_4$ basic	0·0824	9·5	0·043
Pb.O	0·0687	......	1·152
Pb. S	0·00086	2·5	......

* In water saturated with CO_2.

Carlson and Woelfel (8) say—" Pure lead sulphide and the dust of lead sulphide ores are soluble in human gastric juice of body temperatures. Lead sulphide ore dust is therefore soluble in the human stomach somewhat less so than basic lead sulphate, very much less so than basic lead carbonate."

It has been shown that when lead compounds are placed in subcutaneous pockets in guinea-pigs basophil granules appear in the blood at different times. " The basophil granules appeared on the second day after introducing the oxids, on the sixth after the carbonate, and on the twelfth after both sulphid and sulphate, but they were much more numerous in the sulphid animals than in the sulphate. They even succeeded in bringing about this blood change after twenty-six days by rubbing on the shaved skin lanoline with 10 per cent. lead sulphid." (9).

The American workers have not been able to confirm this work, finding that subcutaneous deposits of lead did not produce chronic plumbism in their experimental animals.

Minot (10) by means of intratracheal injections into cats (in which aesophagus had been ligated) of lead carbonate, chromate, sulphate and oxide showed that every one of these substances was absorbed from the lungs and her tables demonstrate no more marked absorption of soluble over insoluble salts which one might have expected. It may be that the pathological condition produced by the experiments have a decided influence on the absorption of the lead compounds and that it would be fallacious to apply the conclusions to industrial conditions. Aub and his colleagues, writing of this series of experiments, say " The fact that even after a few hours significant amounts of lead (20–30 mgms.) were distributed in the various tissues leaves no doubt about absorption of even the most insoluble lead compounds by the lungs."

The mechanism by which an insoluble lead compound may be brought into solution in the lungs or body fluids probably depends upon the action of CO_2 in the presence of sodium hydrogen carbonate; insoluble lead salts are by these reactions converted into more soluble ones. It is suggested that the fact of lead oxide and metallic lead being definitely soluble in blood serum may account for lead poisoning developing rapidly after exposure to lead fumes and lead oxide dust. It is considered by Aub and his colleagues that soluble forms of lead taken into the body are acted on by di-sodium phosphate to form di-lead phosphate and tri-lead phosphate. Tri-lead phosphate is the more insoluble form and it is in this form that lead is stored in the body; a condition of acidosis produced by diet, disease, or metabolic disturbances, may change the tri-lead phosphate to di-lead phosphate.

The workers of the Harvard School are of the opinion that they have proved that lead circulates in the body as a colloidal form of lead phosphate. Certain objections to this theory are given in our account of a new method for the determination of lead in urine.

The amount of lead which is required to produce toxic symptoms when the intake has been spread over a long period of time is not definitely known, but if we may take the experience of Blair Bell (12), who has used various compounds of lead given intravenously in small doses for the treatment of inoperable cancer, the amount necessary to produce toxic symptoms has varied with the susceptibility of the individual, body weight, age and sex. He found that lead given in this manner produced toxic symptoms in males with amounts varying from 100 to 340 milligrammes; in females from 40 to 290 milligrammes.

In this specialised type of work he found that repeated small doses over a long period of time produced a dangerous cumulative effect.

Further details concerning the work of this author will be of interest to all students of industrial lead poisoning, and probably in those cases where there have been a large number of injections of a very small dose of lead the results obtained will have a direct bearing on the problems of industrial lead poisoning.

Bell and Cunningham (12) have further stated that a total of 270 mgms. lead in repeated doses administered in series of doses spread over eighteen months produced a certain cumulative toxic effect on the patient which was difficult to combat. They employed doses not exceeding 40 mgms. and generally much less, but by using larger doses at greater intervals they found it possible to give 600 mgms. in four months without producing any serious ultimate consequences. The fact that Blair Bell and his colleagues found that 20 mgms. of lead was the smallest amount required to produce stippled cells when injected intravenously is commented on in the section dealing with " Signs of Lead Poisoning."

Section 3.—Effect of Lead on Human Tissues.

The most obvious action of lead is on the red blood cells, by bringing about their destruction it causes anæmia in the lead worker. Moreover, the reticulated young red blood cells formed by the bone marrow are acted on by the lead phosphate in the blood serum, and the reticulum is aggregated and stained as basophilic granules, so that a young cell shows a stippled appearance, the basophilic degeneration.

The expectation of life of a red cell showing this stippling is unknown, but that the stippling is of a pathological nature is generally recognised. It has been demonstrated in *vivo* and in *vitro* that the leaded mature red cell becomes more fragile and is destroyed, giving rise to an increase of bile and of hæmatoporphyrin which is excreted in the urine. It is to Key (13) that we owe the proof that the stippled red cells are young red cells. In his experiments he poisoned with lead normal rabbits and others made anæmic by bleeding, and studied the history of the red cells in each. In the normal rabbits the reduction of the red cells following the lead poisoning was accompanied by an increase of young cells, distinguished by their reticulated appearance; in the bled rabbits the diminution of red cells was much less, but the number of stippled cells became much greater. The stippled cells were proportionate in numbers to the young red cells, and they were greater in number in the anæmic, compared with the normal rabbits.

The basophil degeneration in red blood cells is nowhere seen to rival that produced in lead-workers, save only in cases of severe anæmia where the changes in the red cells at once reveal the condition. At the present time marked basophilia of red cells with but slight changes in size, shape and hæmoglobin content, presents a blood picture which is pathognomonic of lead poisoning, but this insidious poisoning may exist in the absence of definite symptoms, it is generally associated with diminished hæmoglobin. In the absence of any clinical details showing the percentage of hæmoglobin, the work of Sellers (18) does not reveal whether or no the so-called normal basophilia of lead-workers which he describes, was associated with low degrees of anæmia.

The action of the lead phosphate on the mature red cells causes a curious change in them, while they will withstand greater osmotic tension as is shown by the fact that they will not completely hæmolyze even in ·1 per cent. saline (whereas normal cells hæmolyze in ·25 per cent. saline) still they show greater fragility and will break up in normal Ringer solution on standing (Lieberman Aub.). Thus lead shortens the life of the red cell by increasing its fragility and rendering it unfit to withstand the wear and tear of circulation. Aub and his colleagues have also shown that leaded red cells are more rapidly acted on by appropriate hæmolysin than normal cells. There are, moreover, changes in the agglutination phenomena. Portion of their work, which may open a new field of investigation, shows that the serum of nephritic patients which has an increase of inorganic phosphates neutralises the effect of lead to a high degree. In marked lead anæmia nucleated red cells with normoblasts and megaloblasts are present. The characteristics of the anæmia are further considered in the section, Signs of Lead Poisoning.

Lead Line and Gingivitis.—The blue or lead line is a very characteristic sign of lead poisoning, and is best developed in lead-workers when the production of Hydrogen sulphide is assured. Given lead circulating in the body and the formation of Hydrogen sulphide from food debris about the teeth, the deposition of lead sulphide occurs beneath the epithelium at the border of the teeth. Where the formation of H_2S is lessened by keeping the teeth clean, this line may only be found in severe cases of poisoning when the gingivitis, which is commonly produced by lead poisoning, aids its formation. Aub and his colleagues point out that it is not seen in severely poisoned herbivorous animals, while in carnivora it invariably appears. All the evidence suggests that the lead in the lead line comes from the general circulation, and this is emphasised by the formation of the bismuth line after the intramuscular injection of bismuth. The gingivitis that so often is associated with the lead line probably results from the local irritation of the gum by the lead. Aub and his colleagues have demonstrated in sections of the blue line that there is a definite area of inflammation near the deposit of lead.

Plain Muscle.—The action of lead on plain muscle is shown by the severe contractions of the gut producing colic and the contraction of the uterus, causing abortion.

There have been advanced in the past various ideas concerning the originating stimulus which produced the typical colic of lead poisoning, various nerve ganglia and nerve endings have been implicated. The work of Aub and his colleagues brings forward certain data that point to a direct action on muscle fibre as the cause of the characteristic lead colic.

Skeletal Muscle.—These authors have also advanced the view that the paralysis or paresis, which typically occurs in lead palsy, may result from the action of lead on the fatigued muscle, and that any nerve degeneration which ensues is due to the peripheral injury. It is well-known that the muscles most used are those which may become paralysed, and it is suggested that this is due to the action of metabolic products formed, such as lactic acid, acting on the lead phosphates circulating in the blood.

Nerve Tissue.—But little is known of the effect of lead on nerve tissues. The view of the Harvard school of workers is that the change found in the nerve and cells of the cord may result from peripheral injury. Following lead palsy in the muscles distinct primary lesions are found in the peripheral part of the nerve, and also in the cells of the cord, and the suggestion is made that these lesions may result from a lymphogenous drainage of lead from the leaded muscles, analogous to that found with tetanus toxin, bacteria and dyes, but the whole question of the action of lead on nerve tissue is still an open one.

Lead Encephalopathy.—Concerning the action of lead on brain tissue, recent workers have stressed the fact that this results in a meningitis, and Hassin (14) has described proliferation of blood vessels in the meninges accompanied with round-celled infiltration. Other authorities record an increase of lymphocytes in the cerebro-spinal fluid to 100 cells per cubic millimetre, together with increased pressure and globulin.

Kidney.—In chronic plumbism when chronic interstitial nephritis is present, the change seen in the kidney is that of small contracted kidneys with thickened arterioles, and acute nephritis has been found in cases of plumbism, there being an acute tubular nephritis with cloudy swelling and degeneration of the tubules.

Blair-Bell and his colleagues (12) have made the following important observations:—

> "Sometimes the earliest and often the most obvious toxic action of lead is on the kidney. The extent and duration of the damage seem to depend both on the amount and the dose given at one particular time and also on the total quantity of lead administered, even when given in small doses."
>
> "We have attempted to study the effect of lead therapy on renal function from five main points of view: (1) clinical manifestations, (2) changes in the blood-urea, (3) changes in the urea-concentrating power of the kidney, (4) changes in the urine, and (5) pathological changes in the kidney."

Clinical manifestations.—" Usually, after small doses of lead, clinical manifestations are not apparent. Occasionally, however, diminution in the secretion of urine and œdema may occur together with changes in the urine. The appearance of symptoms, or of other evidence of renal impairment, has invariably led to the cessation of treatment, at any rate for the time being, with the result that further signs of renal failure have not occurred. Pre-existing renal disease has been regarded either as a contra-indication to treatment or as an indication for small dosage, according to the severity of the disease. Massive doses, however, have led to the appearance of other symptoms which appear to be due to renal damage. These are : pain in the back, haematuria, drowsiness, headache, and vomiting. Headache and vomiting, however, may occur without other evidence of renal failure."

Changes in the Blood-urea.—" Routine estimations have been made of the urea content and in a few cases of the non-protein nitrogen of the blood. The results obtained seem to indicate that small doses of lead are without effect on the value of the blood-urea. Massive doses of lead almost invariably cause a rise in blood-urea, often a marked rise. There is, however, always a subsequent tendency to fall after a few days. With the rise in blood-urea there is a simultaneous fall in the excretion of total-urea."

Changes in the Urea-concentrating Power of the Kidney.—" The urea-concentration test becomes inapplicable of necessity in cases in which there is marked supression of the urine. It is, therefore, of very little value in determining the degree of renal impairment following a massive dose. It was used, however, in one such case after the immediate effects of lead had passed away. No change in the concentrating power occurred at this period. In respect of smaller doses of lead there were also no definite changes."

Changes in the Urine.—" Diminution in secretion often precedes the appearance of albumin in the urine following lead therapy, and is a valuable indication of early renal damage. It occurs occasionally during the administration of small doses and almost invariably after massive doses."

" The quantity of lead administered in several small doses at intervals necessary to produce albuminuria varied from 0·06 grm. to 0·83 grm. Massive doses (0·1 grm.) invariably produce it at once. The albuminuria usually disappears if no further injections are given. This condition has occurred in 43 (23 per cent.) of the cases treated. The total amount of lead necessary to produce it was less than 0·1 gr. in 6 cases, between 0·1 grm. and 0·2 grm. in 23 cases, between 0·2 grm. and 0·3 grm. in 6 cases and over 0·3 grm. in 6 cases."

" Casts appeared in all cases treated by massive doses, but eventually disappeared in most. On one occasion granular and hyaline casts did not appear until seventeen days after the injection of 0·15 grm., to disappear again subsequently. It was unusual to find them after smaller doses."

They conclude :—

" (1) The toxic effect of lead on the kidney as the result of intravenous therapy is sufficiently frequent and of such magnitude as to require the greatest caution in the administration of this drug, especially in large doses.

" (2) The functional impairment caused by many small doses is smaller in degree, but more permanent than that caused by occasional large doses.

" (3) The earliest indications of renal failure appear to be :—(*a*) Diminution in the quantity of urine secreted ; (*b*) the presence of albuminuria ; and (*c*) the presence of œdema.

" (4) A rise in blood-urea does not occur, as a rule, until the damage is sufficiently great to be detected clinically. Changes sufficiently great to be of value have not been observed in the urea-concentrating power of the kidney.

" (5) As in nephropathies due to other causes, it is difficult to correlate functional impairment with pathological change. A case which showed advanced cloudy swelling in three-quarters of the tubules has good renal efficiency as determined by the usual tests."

Pathological Changes in the Kidney.—" The kidneys of two cases which had received massive doses of lead showed little microscopic changes at autopsy apart from congestion ; microscopically very definite changes were found effecting mainly the secreting tubules. . . . It is interesting to compare these findings with the appearances seen in the case of industrial lead poisoning. Tubular necrosis was found together with evidence of long standing chronic interstitial nephritis without much glomerular change."

It is interesting to compare these remarks with our observations on the frequency of granular casts in the urine of lead workers. Sections of the kidney of our case, No. 129, show the increase in the interstitial tissue with degeneration of the cells of the convoluted tubules which may be evidenced of cloudy swelling or may be merely a post-mortem change. The glomeruli appeared congested.

The urea-concentration test of case No. 1 (on 6th October, 1926) showed (1) 55 c.c. 1·4 per cent. ; (2) 70 c.c. 1·4 per cent. ; (3) 80 c.c. 1·4 per cent.

During an examination of 100 motor-car painters by one of us, granular casts were found in the urine of thirteen of the men (1).

The examination of the urine of thirty-three men engaged in a dusty accumulator factory showed the presence of granular casts in fourteen instances. It is worthy of note that granular casts appear in the urine of men treated with intra muscular injections of various bismuth compounds.

Optic Atrophy.—That optic atropy in adults will result from lead poisoning has long been known, and it may be accompanied by paralysis of the eye muscles, most frequently the external rectus, but such conditions are rare, and when present are generally due to degenerative changes following arteriosclerosis and nephritis.

Lockhart Gibson, a Queensland physician, has over a period of many years reported a large incidence of papilloedema, or choked disc, seen in the eye grounds of children poisoned by lead. He found no less than fifty-four cases of optic neuritis among 200 cases of plumbism in children treated in the Brisbane Hospital for Sick Children. This condition was found in children with signs of lead poisoning and who were nearly all in the habit of biting their nails, so that they appear related in character to the cases of lead poisoning reported by several writers in children who ate the lead paint of their bedsteads.

This interesting observation of Lockhart Gibson has in Australia been criticised by savants in other States (in which lead poisoning among children is very rare), who had no personal knowledge of the cases with which Lockhart Gibson dealt. Considering that many of these children exhibited encephalopathic conditions and that encephalopathy is now described as being a productive meningitis, it is reasonable to expect that an oculist might frequently discover evidences of choked disc, and this has happened. That Lockhart Gibson has found a greater incidence of this condition than observers in other parts of the world, is to be expected when the amount of lead poisoning among children in Queensland, and the wide knowledge that he has of these cases, is remembered. An account of this most interesting work on lead poisoning of children in Queensland is given in another section, where the work of the Australian Institute of Tropical Medicine is reviewed.

Bone and Bone Marrow.—No pathological change from the storage of lead in the bones has been found, nor has the bone marrow, despite the anæmic condition produced by lead, shown anything more than hyperplasia. No evidence is available to show that lead does more than increase the hæmapoietic function of the marrow. Recently, we have found megaloblasts in the blood smear of a youth definitely suffering from lead anæmia, but despite the references to such findings by other workers, we feel that this youth must be kept under observation in order to exclude the possibility of pernicious anæmia existing in conjunction with his lead anæmia.

General.—Apart from changes in the blood, the pathological changes in tissue which have until recently been generally accepted as resulting from lead, have been the minute hæmorrhages described by Legge and Goadby, and others. These hæmorrhages were followed by a condition of fibrosis. A criticism of this view has been made by the Harvard workers, who say that so frequently does anæmia and nephritis appear in lead poisoning that such hæmorrhages would be expected, and are not specific for lead. Legge and Goadby found minute hæmorrhages in peripheral nerves, but the description generally accepted is that a neuritis occurs with subsequent atrophy and degeneration.

Aub and his colleagues consider that the pathology of lead poisoning may be summarised as follows :—

A. Lesions found constantly, due to lead.

  1. Blue line.
  2. Anæmia and stippling.

B. Lesions found frequently, due to lead.

  1. Degeneration of anterior horn cells.
  2. Peripheral neuritis.
  3. Chronic muscular atrophy and fibrous myositis.
  4. Degeneration of male gonads.
  5. Decrease in fat cells of bone marrow and hyperplasia of leucoblasts and erythroblasts.
  6. Productive meningitis.
  7. Blue patches on mucosa of large and lower part of small intestine.
  8. Optic atrophy.

C. Lesions seen frequently in people with evidence of lead absorption—

  1. Arteriosclerosis.
  2. Ulcers of stomach and intestine.
  3. Contracted small intestines.
  4. Tubular nephritis or chronic interstitial nephritis.
  5. Hæmorrhages and exudate of retina and neuro-retinitis.

Section 4.—Storage of Lead in the Body.

"Typical lead poisoning is a chronic intoxication, which is characterised by a marked latency of development, and frequent recurrence. These features suggest a storage of lead in the body, and make knowledge of the amount and localisation of lead retained in the organism of fundamental importance in understanding the disease." (Minot.)

The recent work of Minot is of so definite a character and so thoroughly done that it is essential in writing of the storage of lead in the body, to recapitulate the fundamental experiments upon which the views of the Harvard School are based. By numerous experiments on cats, Minot compared the rate of absorption of lead through the gastro-intestinal and respiratory tracts and its distribution in the body during active absorption, and after absorption had ceased.

A fact that must be stressed in any account of the mechanism of storage, is the great difference to the organism, the manner of lead intake creates. For the past twenty years danger from the inhalation of lead has been recognised as much greater than that arising from the ingestion of lead. This fact depends on the ability of the liver to absorb lead which is brought to it by the blood supply from the gastro-intestinal tract, and to re-excrete it by the bile, so that only a small amount of the lead ingested enters the general circulation. When lead is taken into the lungs and brought into the general circulation the protective function of the liver is absent, so that a smaller amount of lead may cause more toxic signs and symptoms when inhaled, than a larger amount when ingested. It was finally shown that after active absorption had ceased nearly all the lead was stored in bone as an insoluble phosphate.

It was noted that the amount of lead stored in the liver did not increase as the absorption continued owing to the powers of elimination of this organ, but the store of lead in bone markedly increased. In the case of a man aged 25, who died of a lead encephalopathy two days after leaving his work, where he had been exposed to lead oxide dust for five months, the distribution of lead quoted as milligrammes per hundred grammes of tissue, was as follows :—

	Milligrammes.	
Liver	0·12	per 100 grammes of tissue.
Kidney	0·35	
Lung	0·29	
Cerebellum	0·49	
Skeleton	2·24	
Blood	0·28	

In the case of a man aged 53, a paint mixer for fifteen years, who had had signs and symptoms of lead poisoning nine months previously, but who was considered to have died from pernicious anæmia, lead was only found in the bones, there being 2·47 milligrammes per 100 grammes of tissue.

The distribution of lead in the organs of a painter aged 60, killed by a fall, with no symptoms of lead poisoning, was found by Minot to be—

	Milligrammes.	
Liver	0·68	per 100 grammes of tissue.
Kidney	2·45	
Cerebrum	0·22	
Skeleton	7·16	

These authors consider that the features of this case are the storage of considerable quantities of lead in the liver, indicative of continued gastro-intestinal absorption and the presence of lead in the kidney and central nervous system, a sign that the process of transportation was active despite the absence of symptoms.

Two questions arise immediately concerning the effect that this work will have on our outlook regarding lead poisoning. Firstly, does it support the theory of Straub and Erlenmeyer, who concluded from their experiments that it was not the store of lead that produced the toxic effects, but rather the "lead stream," or the minute amounts of lead in the circulating blood. In the words of Alice Hamilton "They point out that the stream is always small, too small to produce any effect were it a single dose, but that as the transportation and absorption continue innumerable subminimal attacks bring about pathological changes in certain sensitive tissues, and both time and the concentration of this 'lead stream' are important factors in the production of toxic symptoms (15)."

The other question that arises from this work is what will be the disadvantage to the individual of this storage of lead in the bones, under what conditions will it be liberated, and may this mobilisation of lead produce toxic effects?

The Harvard workers conclude that "when lead is absorbed into the general circulation it is brought into contact with every tissue in the body. There is however no marked retention of lead except by the skeleton . . . in other words lead is not stored at the sight of injury. This fact does not, however, imply that there is an absence of chemical affinity between the soft tissues and lead, but rather that lead compounds which are formed by interaction with these tissues are not retained."

In regard to the second question, their reply is "At this point, however, the old theory of Gusserow comes to mind, with the disquieting suggestion that this desirable condition may not be permanent. He advanced no proof for this but recent chemical evidence substantiates the possibility that the skeletal deposit may be released, for a slight change toward either the acid or alkaline side of the usual hydrogen ion concentration of the organism can readily reduce the stability of a tertiary phosphate. It is quite conceivable that abnormalities of diet, or certain pathological conditions, might bring about such changes. It is desirable now to mention (*a*) that the deposit of lead retained after the absorption of lead salt is known to be rather unstable chemically, and (*b*) that this deposit is held within the body where its release would involve the danger of flooding the organism with soluble lead."

Individuals with large skeletal stores of lead have been called cases of latent plumbism, which may become manifest under certain conditions which will liberate the lead.

How frequently the mobilisation of such a store of lead may afflict lead workers still employed in their vocation is quite unknown, but in the words of Minot it offers an explanation of the chronic intoxication, the "latency of development," and the "frequency of recurrence," that are such marked features of plumbism.

There are not many recorded manifestations of a new attack of lead poisoning affecting individuals removed from lead work for some time. There are, however, a series of cases described by Shufflebotham (16) among army recruits subjected to hard training, and in cases of acute illness following injury, and similar records occur in American literature.

Now that attention has again been drawn to this interesting fact by the American authorities, such cases will be looked for and will probably be found among lead workers sick of acute illness, or in those in whom disease has produced a metabolic disturbance, or among those treated with drugs such as potassium iodide, or acids, which will aid the mobilisation of the skeletal storage of lead.

We have made the following analyses of the tissues of three individuals whose histories and other details are given.

Case 1.—Man aged 35, died from coal-gas poisoning. No known exposure to the lead.

Sternum	0·04	mgm. per 100 grm.
Brain	0·00	,, ,, ,, ,,
Kidney	0·09	,, ,, ,, ,,
Lung	0·00	,, ,, ,, ,,
Liver	0·07	,, ,, ,, ,,

Case 2.—Man aged 60, died of myocarditis, had marked arteriosclerosis. He was a labourer who had recently been engaged for several week-ends in house-painting.

Vertebra	0·72 mgm. per 100 grm.
Sternum	1·48 ,, ,, ,, ,,
Brain	0·27 ,, ,, ,, ,,
Kidney	0·08 ,, ,, ,, ,,
Lung	0·05 ,, ,, ,, ,,
Liver	0·34 ,, ,, ,, ,,
Muscle	0·05 ,, ,, ,, ,,

Case 3. (No. 129 of Appendix 1).—Motor-car painter aged 42. He had a severe attack of lead poisoning fifteen months before death and had not worked since. Clinically he had definite arteriosclerosis and nephritis.

Sternum	0·08 mgm. per 100 grm.
Brain	0·10 ,, ,, ,, ,,
Kidney	0·11 ,, ,, ,, ,,
Lung	0·06 ,, ,, ,, ,,
Liver	0·26 ,, ,, ,, ,,
Heart	0·13 ,, ,, ,, ,,

Post-mortem.—No definite pathological changes apart from flabby myocardium and kidney of "medium white" type.

Sections of heart wall showed extensive endarteritic changes in the coronary vessels.

Sections of the kidney showed increase in the interstitial tissue with degeneration of the cells of the convoluted tubules, which may be evidence of cloudy swelling, or may be merely a post-mortem change. The glomeruli appear congested.

Sections of the liver showed passive congestion with accumulation of brownish pigment in the cells of the centre of the lobules. Fatty degenerative changes were also present.

Section 5.—Forms of Lead Poisoning.

Lead poisoning occurs in two forms (1) acute, (2) chronic.

Acute lead poisoning follows from a large intake of lead over a short period, and occurs either as an accident, from a suicidal intent, or by the use of lead as an abortefacient. Industrial lead poisoning is rarely of this acute form. Unfortunately, the practice has grown up of using the term "acute poisoning" to refer to any severe symptoms, or signs, arising from chronic poisoning.

Chronic lead poisoning is the usual form of lead poisoning found in industry, and it is caused by the accumulation and storage of lead in the body resulting from weeks, or months, or years of exposure to a lead hazard. Certain of the severe symptoms and signs of both chronic and acute forms of lead poisoning are similar. Chronic lead poisoning may be divided into three types, but there is no line separating these types, and the symptoms and signs common in one type are found in all. In practice, however, it is generally possible to distinguish—

Chronic Lead Poisoning.—1. Early or mild (anæmia, pallor, stippling of red cells).
2. Late, or severe (colic, palsy, encephalopathy, arthralgia).
3. With sequelæ (arteriosclerosis, nephritis).

Section 6.—Symptoms of Lead Poisoning.

Abdominal pain and colic.—One of the best descriptions of the abdominal pains and colic so frequently present in cases of lead poisoning, is that given by Brown in his recent report of eighty-three men who were poisoned by lead from Oxyacetylene welding. He found abdominal pain in 95·5 per cent. of the cases, and says "This varied widely in intensity, i.e., from severe colic wholly incapacitating the patient to slight griping or dull pain. As a rule it was not sufficiently severe to be designated as colic; in the majority of instances it localised in the umbilical region, in others generally in the lower abdomen, and still others in the epigastrium. Some patients described the attacks as entirely irregular as to time and frequency, others reported them as most apt to appear during the night; in other cases the pain appeared to be initiated by eating, or it would be continuous over the twenty-four hours with remissions and subsequent return. In a considerable number, after the acute stage had passed, it would appear at regular intervals after meals. Abdominal examination failed to bring out any general or localised tenderness or spasm in any of the cases reporting abdominal pain."

Colic would appear most generally to depend on the presence of obstinate constipation, and if in a lead worker this is prevented (frequently a difficult matter owing to the effect of lead on the plain muscle of the gut) true colic is seldom seen. Almost invariably there is a history of constipation preceding colic. The Harvard School has shown that lead may act directly on smooth muscle, and their present outlook regards the cause of abdominal pain as the result of this direct action of lead on the plain muscle of the gut. Acting on the muscle lead produces increased tone and loss of motility which may be followed by a constriction. When a constriction of the bowel approaches an amotile hypertonic area of the gut, abdominal pain of varying severity results. Such a mechanism is similar to that seen in those suffering from intestinal obstruction. Abdominal pain must be considered a very marked feature in the majority of lead poisoned individuals. Frequently this pain will be severe enough to be called colic, but to say that colic will occur in the majority of lead poisoned cases is making too severe a standard for diagnosis, especially as the presence of this symptom may depend on the failure to take sufficient purgative drug to overcome the increased amotility of the bowel.

It is worthy of note that gastric ulcers are often found in individuals with lead poisoning, a fact which serves to add to the difficulties of diagnosis. It is thought by several authorities (and there is some experimental evidence in support) that these ulcers may result from the effect of lead. In this connection we may refer to the epigastric pain which is quite a common symptom in lead poisoning and is apparently not connected with gastric or duodenal ulcers.

Headache.—This is a very common symptom especially in severe cases of poisoning, and it is usually frontal. It is generally related to anæmia, or in the later stages of lead poisoning to arteriosclerosis or nephritis.

Insomnia.—May be a very marked symptom in severe cases, and is generally associated with mental depression.

Pains in the Joints.—Are often complained of and inquiry will reveal that they made their appearance along with abdominal symptoms. Sometimes these pains are very severe and come to be one of the toxic episodes of lead poisoning, Lead Arthralgia.

Muscular pains, resembling lumbago, and soreness of the calves, are commonly complained of, and if the history of these pains is definitely related to other symptoms they have a greater value for the purpose of diagnosis, but necessarily they have to be differentiated so far as one is able, from fibrositis and myalgia, produced by causes other than lead.

Malaise and debility of an increasing character is a common symptom, and careful inquiry will frequently elicit a history of the patient noticing an increasing inability to handle a paint brush, or other tool with the usual facility when there is no definite paresis of the muscles, it is in these cases that the use of the dynamometer of the Collin type may reveal a definite muscular weakness.

General.—Loss of appetite, metallic taste, breakfast anorexia, and minor gastric disturbances, are all complained of, and are obviously of more value from the point of view of diagnosis when there are signs of lead intoxication, than in their absence.

SECTION 7.—SIGNS OF LEAD POISONING.

Blue line, or lead line; anaemia; stippling of red cells (Punctate Basophilia); pallor; muscular paresis or palsy; tremor; mental disorders; lead in urine and faeces.

Blue Line, or Lead Line.—Of the signs of lead poisoning, this is the most easily recognised, as with signs of other diseases reasonable judgment must be exercised in weighing its value as evidence of plumbism. This sign of chronic lead poisoning may be found also in individuals who present no other signs and complain of no symptoms of this disease; but this fact does not discount the value of the blue line when associated with other signs and symptoms of chronic plumbism. No medical man would diagnose lead poisoning except in a very minor degree merely from the presence of the blue line. None would deny its significance when associated with other signs and symptoms of plumbism. It is the best evidence of an intake of lead by the patient, better than the finding of lead in the urine or faeces, for it implies that the exposure to lead has been extensive, whereas the lead found in the analysis of the urine or fæces might possibly be related to a single ingestion or inhalation of lead. It is doubtful if the bismuth line, now so common among patients suffering from syphilis who have been treated by muscular injections of bismuth, can be distinguished from the lead line, but in practice no difficulty is found in separating these two conditions if the examination of the buttocks of the patient, for evidence of bismuth injections, is done in the routine examination. Despite the fact that the lead line is not difficult to recognise, one is surprised how often quite experienced practitioners call discolouration of the teeth or gums a blue line. The use of a hand lens and the practice of inserting the corner of a visiting card between the gum and the tooth is recommended. Associated with the blue line there may be gingivitis and carious teeth, both conditions can arise from, or be aggravated by, the deposition of lead in the gums.

The Anæmia and Punctate Basophilia of Lead Poisoning.—Several investigations have recently been published on this subject. May Meyers (17) has given the results of the blood examination of 381 lead workers in New York. This was a "status" examination; no man was incapacitated, all were at work; and no acute case of lead poisoning was examined; 62 per cent. of the men showed blood changes in the following order of frequency:—

	per cent.
Anæmic red cells	71
Changes in size of red cells	44
Polychromasia	40
Stippling	39
Changes in shape of red cells	23
Nucleated red cells	8

She found an average red cell count of four million, with an average hæmoglobin of 79 per cent, giving a colour index of a little less than 1. She considers the significant thing in differentiating lead anæmia from ordinary secondary anæmia is this: That accompanying an anæmia which from the red cell count and from the hæmoglobin appears to be very slight; there may be such serious blood changes as stippling, polychromatophilia, the presence of nucleated red cells in considerable numbers, anisocytosis, poikilocytosis, and even eosinmyeloblasts, and Türks irritation cells—all of these pointing to a blood condition out of all proportion to what one would be led to expect from the red cell count and the hæmoglobin. She notes that the characteristic pallor of lead poisoning bears no relation to the red cell count or the hæmoglobin percentage.

Mathew, of the Australian Commonwealth Health Laboratory, Port Pirie (South Australia), has placed before the Royal Commission on Plumbism, of South Australia (published 1925), a very interesting and informative statement concerning the blood examinations of 300 men who are, or were, employees of the Broken Hill Associated Smelters at Port Pirie (S.A.). These men were referred for examination by medical men attending them as cases of lead poisoning. He found—

Hæmoglobin reduced to 80 per cent. or lower	114 men.
Red cell count, 4½ million, or lower	29 ,,
Basophilic degeneration of red cells	89 ,,

The medical officer of the company, in report of the same commission, gives an account of the medical examination of 97 men receiving compensation. His account shows a large amount of scientific investigation. It might be pointed out that in our time individuals do not "suffer from lead absorption;" *this shibboleth is passing.* If it is desired to refer to individuals who have not been greatly affected by an intake of lead, they may be said to suffer from a minor degree of lead poisoning. Chronic plumbism has not been dissociated from chronic carbon monoxide poisoning in certain of these cases.

Blair Bell and his colleagues, writing on the effect of lead on his patients who have been treated by various lead compounds, given intravenously, consider that punctate basophilia is one of the earliest signs of lead poisoning, and they are convinced that this condition does not occur in normal blood (12).

The time of appearance of the stippled cells in the blood, after the intravenous injection of lead, they found to depend on two factors. Firstly the amount of lead given, secondly the susceptibility of the patient. The smallest amount of lead to produce stippled cells amounted to only 20 milligrammes, and the earliest time they were observed in the blood was three hours after an injection of 100 milligrammes of lead. They describe, also, polychromasia, nucleated red cells (when present invariably associated with considerable anæmia, and stippled red cells), anisocytosis, and poikilocytosis, and give an account of the anæmia produced by lead being accompanied by pallor, headache, lassitude, and muscular weakness. Their remarks on the time taken to recover from lead anæmia are interesting. "In those cases who had submitted to frequently repeated small doses, recovery from the anæmia is a rather lengthy process." But it was complete in those cases that recovered from malignant disease under treatment.

There is no present knowledge concerning the amount of lead, determined by modern methods, circulating in the blood during any phase of lead poisoning with the exception referred to below, and this item is receiving our attention. It should be possible to determine the amount of lead in the blood stream which gives rise to the earliest manifestation of poisoning (*i.e.*, punctate basophilia of the red cells).

The observation of Blair Bell and his colleagues is that 20 milligrammes is the smallest dose given intravenously which will cause stippling; as this amount would cause a concentration in the blood of roughly 4 or 5 milligrammes per litre, it seems large; probably many factors at present imperfectly understood come into play in this matter.

Minot, Aub and Fairhall report that the blood of a man who died of lead encephalopathy contained 8·2 milligrammes of lead per litre. He was only in hospital two and a half days. The blood findings were hæmoglobin 80 per cent, red cells 3,352,000, and there was marked stippling. If this information can be applied directly as bearing on the amount of lead in the blood which may cause basophilia, then the assumption could be made that somewhere about 10 milligrammes of lead in the circulation is the smallest known amount of lead which will cause the characteristic stippling of the young red cells found in lead poisoning. The relation between this dose and the hæmopoietic function of the marrow is undefined. Lead is said to stimulate the marrow and cause hyperplasia of the reticulo-endothelial system, whether directly or indirectly by the destruction of red blood corpuscles is unknown. The proof that Keys' work provided that stippled cells are young red blood corpuscles has been referred to in a previous section. Aub and his colleagues sum up that "Stippling is the most reliable of the early rather indefinite signs and symptoms of lead intoxication." They very properly stress the necessity to rule out other pathological conditions in which stippling is found, as pernicious anæmia and leukæmias. They found that during plumbism stippling varied greatly during daily examination of the blood of individuals suffering from chronic poisoning. While it is now quite clear that stippling of red cells is a definite sign of lead intoxication, the relation it bears to the lead intake or lead in circulation in the blood, or lead stored in tissues is not known.

In mild cases of lead poisoning stippling very quickly disappears from the blood when the exposure of the individual ceases. Probably there is a direct relationship between the number of stippled cells found and the amount of lead in circulation in the blood, but this relationship will be varied by individual susceptibility and the establishment of tolerance.

The immunity reactions of the human body to inorganic poisons are almost unknown. Only for manganese is there any evidence of the formation of anti-bodies. It must be stressed that in mild cases of lead poisoning the search for basophiles must be made as soon as possible after employment has ceased, and that there is moreover a certain intermittency in the production of the stippled cells which may at times cause a considerable reduction in their numbers, but if search is made under the conditions indicated stippled cells will be found in practically every case of lead poisoning with mild or severe symptoms and a history of recent exposure to lead. Stippled cells will not be found in cases of nephritis and arterio-sclerosis when these are the sequelæ of lead poisoning, unless there is also present the history of recent exposure. Sellars' work on the punctate basophilia of workers in accumulator factories is of interest for it is these men who are engaged in battery making who now furnish many cases of lead poisoning in New South Wales. Taking the various processes, basophilia was found by Sellars in from 25 per cent. to 80 per cent. of the men engaged, averaging 63·7 per cent. for all processes. These men were not considered to be lead-poisoned. The processes in which the exposure to lead dust was greatest showed the greatest percentage of men with basophilia (18).

It must be remembered that this work of Sellars deals only with a quantitative estimate of stippled cells in the blood smears of battery workers who were considered in general not to be affected by lead poisoning. The facts given relate merely to the presence and number of basophiles. There is no record of the association of this condition with reduced hæmoglobin or diminished red cells, polychromasia, anisocytosis, poikilocytosis, nucleated red cells, &c. His conclusions are apparently to be related to the condition of stippled cells with no other pathological changes in the blood, unless a further report comes to one's aid in appreciating the value of this work. He concludes that "punctate basophilia is probably present in all cases of lead poisoning, but it may be absent or present only intermittently. Therefore a negative result should not be regarded as conclusive unless repeated examinations have been made within a reasonable time of cessation of work. In typical cases of lead colic, punctate basophilia is almost invariably present and a negative result in cases of that type is strong evidence against lead poisoning. A slight degree of punctate basophilia should be regarded as practically a normal condition in men exposed to lead and is therefore a piece of evidence of no diagnostic value. A high degree is of greater diagnostic value, but it is by no means a definite proof of lead poisoning. The writer is not prepared to say what constitutes a high degree though the standard of 300 per million is certainly too low."

From our work we consider that punctate basophilia or stippling of the red cells is a very constant characteristic of the blood in lead poisoning, and that it probably bears a definite relation to the amount of lead in the blood stream. It is not always to be found in the healthy lead worker. It is rarely absent when there is any degree of anæmia or slight or severe symptoms or signs of lead poisoning, when an examination of the blood is made while the worker is still engaged at his craft. In mild cases of lead poisoning the stippled cells disappear within a few days. In severe cases they will be found over a period of weeks or months after the last exposure to lead. They are not found in the blood of individuals not exposed to lead suffering from the sequelæ of lead poisoning (nephritis, arterio-sclerosis, palsy) unless a mobilisation of the skeletal store of lead occurs.

In small numbers from 1 to 300 per million, unassociated with other blood changes as reduced hæmoglobin, polychromasia, changes in size and shape of the red cells, they have for the purpose of diagnosis in lead poisoning a better value than lead in the urine and the blue line, and must be construed along with the symptoms of the patient. But when associated with reduced hæmoglobin, anisocytosis or poikilocytosis or nucleated red cells, even in the absence of symptoms of lead poisoning they definitely establish a diagnosis of lead poisoning if there has been a definite lead intake and there is no reason to suspect a primary or secondary anæmia not resulting from lead.

It will help to exclude other moderate anæmias if it is remembered that in no other condition is there found the same amount of stippling of the red cells with such slight changes in the blood picture generally.

When a profound anæmia has resulted from lead poisoning and there are found gross changes in the red cells with nucleated reds including megaloblasts, there will in our experience always be found other signs and symptoms of lead poisoning which will enable one to know that the condition is not due to a pernicious or other primary anæmia.

Pallor.—In a well-marked case of mild or severe chronic lead poisoning there is nearly always seen the pallor which is so characteristic a feature of plumbism. While this sign is often seen in subjects in whom the reduction of hæmoglobin is marked, nevertheless it does not depend upon the presence of a definite anæmia. When a marked anæmia is present the face has an icteric colouring, due to the products formed by the destruction of red cells, while the pallor seen in other subjects is thought to depend upon the action of lead on the capillaries of the skin. It is generally remarked that while examining a patient with this pallor the face may become flushed and the appearance of the patient changed.

Tremor.—A fine tremor of the fingers is frequently seen in subjects with lead poisoning, and is of importance when associated with more typical signs, but when occurring without them such a common sign of many diseases is of little diagnostic value.

Muscular Paresis and Palsy.—It is much more common to find a history of muscular weakness among lead workers than to find a definite palsy of the antibrachial, brachial, Aran-Duchenne or peroneal type.

A subject affected by chronic lead poisoning will frequently complain of difficulty in handling a trade tool owing to its apparently increasing weight, and will often refer to pain in the articulations associated with the muscles which are picked out by lead poisoning. Besides the muscles which are specially liable to bear the brunt of the poisoning, there may be a generalised weakness of all the muscles of the hands and arms. Sensory symptoms are rare, but there may occur " a general lassitude accompanied by painful cramps or tremor of the muscles which are later involved. Sometimes formication, numbness or a dull ache, very rarely hyperæsthesia, develop in the injured region " (2).

Mental Disorders.—Mental disorders of a minor grade are often present in lead poisoning and in severe cases typical lead encephalopathy occurs with mania and epileptiform convulsions. Probably in all severe cases of poisoning there is a definite degree of mental change due to the cerebral irritation arising from the meningitis which is now described as the primary brain lesion of lead. " In almost every case of plumbism there is a change in the mental attitude which may be so slight as to be overlooked entirely, or may consist in general sluggishness and dullness with poor memory inability to concentrate and a tendency towards restlessness and irritability." On account of its similarity to other types of disease differential diagnosis of lead encephalopathy is very difficult. It may simulate tumors and syphilis of the central nervous system, cerebral hæmorrhage, epilepsy, chronic alcoholism, uræmia, eclampsia, hysteria and even neurasthenic disturbances; and great care must therefore be employed in differentiation (2).

Lead in Urine and Fæces.—During the years 1925–1926 we conducted a series of quantitative analyses for lead in the urine and fæces of individuals who were suspected to be suffering from lead poisoning. In many cases the industrial history of these subjects showed a remote or negligible exposure to lead, but we were glad to include them in our work, which we regard as a preliminary survey of the problem.

Our industry has been rewarded by a considerable broadening of our view on the subject of lead excretion. In the meantime the American committee investigating the Tetraethyl problem in America has published a preliminary report, and we are able to compare our results with those they have published. It is still too early to express a definite opinion as to the amount of lead in urine which may be expected in the various stages of lead poisoning.

It was our original intention to endeavour to determine the relation between the amount of lead in the urine and fæces to the various stages of lead poisoning and, in particular, to the mild or early chronic poisoning when the subject was but recently removed from his work. We cannot, however, go further than to say that an excretion of between 0·10 and 0·2 mgm. of lead per litre (or even more) may generally be expected in such cases, but where the anæmia is marked the amount excreted may be quite small. What effect morbid conditions of the kidneys have on the lead excretory function is unknown, and our only evidence suggests that probably acute nephritis inhibits excretion more definitely than chronic nephritis.

Brown (19) in a recent account of lead poisoning among men engaged in ship-breaking reports the determination of the amount of lead in the urine of twenty-six men who were poisoned and of three who were not affected. The urine examined in each case was from a 24–48 hour specimen, and his results are given on a basis of 2,000 c.c. Reducing these results to one litre for comparison with our work, he found lead in amounts of from 0·25 to 1·25 mgm per litre, but the average was only 0·23 mgm. per litre. The unaffected workmen showed from 0·03 to 0·15 mgm. per litre. Of the men who were poisoned half the number showed an excretion above 0·2 mgm. per litre.

The most accurate estimation of the amount of lead excreted by individuals with chronic plumbism were those made by Aub and his colleagues. The subjects were patients with chronic plumbism removed from exposure to lead for some time. They state: "Thus the extreme ranges of urinary excretion for three-day periods in all the cases studied was from 0 to 0·096 mgm. of lead, while the corresponding elimination in the fæces varied from 0 to 2·05 mgm. The averages . . . naturally varied much less—from 0·12 to 0·78 mgm. of Pb. in urine and from 0·06 to 1·86 mgm. in fæces. Obviously the excretion of large amounts of lead must be accomplished by the gastro-intestinal tract, and therefore the greater the total output of lead the greater becomes the disproportion between the quantities of lead eliminated in urine and fæces." The preliminary report of the committee of the United States Public Health Service on Tetraethyl lead shows that an extensive investigation was made into the excretion of lead by the fæces. They examined 252 individuals exposed and not exposed to lead intake, and found lead in varying amount in the majority of the total examined, while lead was also found in the fæces of ten laboratory workers who had no known exposure to lead. The lead content of the fæces of this latter group ranged from ·047 mgm. to ·290 mgm. per gramme of ash. While their work was progressing we were pursuing similar investigations in this city. Our results have been given for the total fæces passed in twenty-four hours, and in order to make a comparison it may be stated that approximately 100 grammes of formed fæces yield 2·5 grammes of ash. We have also found lead in the fæces of laboratory workers with no known exposure to lead and in all cases of suspected lead poisoning investigated, as shown by the accompanying Appendices. In many of the cases of suspected lead poisoning the exposure to lead at their work was doubtful, negligible, or remote, and we have decided to search the foodstuffs, tea, &c., consumed by them for the source of this lead.

In the Appendices it will be seen that the amount of lead excreted by the urine ranges from 0·02 mgm. per litre to 0·55 mgm. per litre, and in the fæces from 0·03 mgm. per 100 grammes to 13·6 mgm. per 100 grammes. The Appendices also show the number of days which had elapsed since the last exposure of the individual to lead and the diurnal excretion of lead.

SECTION 8.—STANDARDS OF DIAGNOSIS.

Before detailing standards which have been used in the diagnosis of lead poisoning, it is necessary to state clearly the fact that an accurate diagnosis of lead poisoning can only be made by an efficient examination of the patient at the time he complains, or very shortly after he has complained, of disabling symptoms, or has presented signs of the disease and has not been withdrawn from his work for more than a few days. The standards which we advocate have therefore been laid down for these conditions and make no attempt to cover a diagnosis of lead poisoning in patients seen weeks or months after the onset of disabling symptoms, and of whom no proper pathological and medical examination has been made at the critical time for diagnosis.

The duty of any medical man attending a suspected case of lead poisoning is—

Firstly, to establish the fact that there has been a definite intake of lead (this may be done by noting the presence of the blue line or making a chemical analysis of the urine).

Secondly, to examine the blood of the patient for the percentage of hæmoglobin present and the presence of stippled cells or other cell changes.

Thirdly, to examine the urine for casts and albumen.

Fourthly, to determine by his clinical skill the character of the abdominal pain, if present, and the nature of the headache, muscular weakness, &c.

Fifthly, to exclude to the best of his clinical skill morbid conditions not due to lead.

Standard given by Aub and his Colleagues.—Of the standards which have been published by various authors, probably the most precise and generally useful is that given by Aub and his colleagues. It requires for the accurate diagnosis of early or mild chronic plumbism "one typical sign of a lead intake and two signs of a generalised intoxication." For evidence of lead intake these authorities rely on the blue line, or lead in the excretions, and for signs for general intoxication they take pallor, stippling of the red cells, mild secondary anæmia; symptoms such as headache, indefinite weakness, anorexia, loss of weight, constipation, they consider will be associated with these signs in early or mild chronic plumbism. These authors consider that this mild form of lead poisoning leads on in varying time to the severe form of chronic plumbism with one or more of the toxic episodes of colic, palsy, encephalopathy, optical disturbances, lead arthralgia.

It may be useful here to quote the words of these authors to define what is meant by the term colic:—

> "While suffering from colic, patients are cold, pale, and often drenched with perspiration. They commonly bend over and writhe about in bed in intense pain. Between attacks they are usually very restless, probably because of the sense of constant pressure in the abdomen, which persists even between the intermittent spasms. The pain is of a tearing or griping nature, and its intensity varies markedly. It occurs intermittently but with no apparent regularity—attacks are separated by intervals of only a few minutes or several hours. Although usually below the umbilicus, the discomfort shifts from one part of the abdomen to another, and patients often show its location characteristically by spreading both hands widely over the lower part of the abdomen."

To our minds another useful standard for the determination of lead poisoning was that designed by Newman, McConnell, Spencer and Phillips, during their status examination of workers in the American potteries in 1922.

Standard designed by NEWMAN, MCCONNELL, SPENCER and PHILLIPS.*—*Tentative Classification for an early diagnosis of Lead Poisoning.*—

(1) A history of known or suspected exposure to lead in any form.

(2) The personal history and physical examination of the worker, with a view to eliminating conditions which would possibly simulate symptoms of lead poisoning.

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* Extract from Public Health Bulletin, No. 116 (May, 1921), United States Public Health Service: "Lead Poisoning in the Pottery Trades."

As an aid to a decision on the positiveness of lead poisoning it is recommended that a choice of any two or more symptoms, selecting one from each of the following groups, would, in conjunction with the numerous minor symptoms that are always present if these major symptoms are noted, be a reasonable basis for a diagnosis of positive lead poisoning. Should only one of these major symptoms appear, in combination with two or more symptoms of the presumptive group of the same general headings and also in conjunction with the minor symptoms that would be present, a diagnosis of chronic lead poisoning could also be made. Emphasis has been placed on the combination of the so-called major symptoms and the minor symptoms, because it is very unlikely that such major symptoms would ever be found alone in any case of lead poisoning. A combination of minor symptoms invariably accompanies more typical ones :—

- (*a*) General appearance :
  - Marked pallor and profound anæmia.
- (*b*) Digestive system :
  - Colic,
  - Obstinate constipation.
- (*c*) Muscular system :
  - Muscular inco-ordination.
- (*d*) Nervous system :
  - Peripheral motor paralysis of certain extensor muscles (wrist and ankle drop) and atrophy of most used set of muscles.
- (*e*) Vascular system :
  - Blood—basophilic degeneration with diminished hæmoglobin.
- (*f*) Special organs and findings :
  - Gums—lead line. Stools and urine—lead.
  - Miscarriage—repeated. Liebermann's test—positive.

In a like manner presumptive diagnosis would be suggested by the findings of any three or more symptoms selected singly from each of the following general headings. Here, also, a combination of minor symptoms assists a decision :—

- (*a*) General appearance :
  - Pallor.
  - Anæmia.
  - Emaciation.
  - Drawn expression.
- (*b*) Digestive system :
  - Loss of appetite or repugnance to food.
  - Breakfast anorexia.
  - Vomiting on eating solid food.
  - Sweetish or metallic taste.
  - Gastric disturbances.
  - Constipation.
  - Pain in abdomen.
  - Parotitis.
- (*c*) Muscular system :
  - Loss of strength.
  - Malaise and tiring easily.
- (*d*) Nervous system :
  - Headache.
  - Insomnia.
  - Mental lethargy.
  - Tremor.
  - Dizziness.
  - Convulsions.
  - Mental affections.
  - Encephalopathic conditions.
  - Arteritis.
- (*e*) Vascular system :
  - Arteriosclerosis.
  - Hypertension.
- (*f*) Special organs and findings :
  1. Eyes—Impairment of vision, including muscular inco-ordination.
  2. Joints—various pains.
  3. Blood—basophilic degeneration with diminished haemoglobin.

While it is true that in other industries as well as in potteries workers show on numerous occasions and under varying conditions symptoms which, when taken in conjunction with other symptoms, may be characteristic evidence of some degree of lead poisoning, yet such symptoms would be only suggestive of this particular poisoning. However, if his occupation exposes the worker to a lead hazard, and if any combination of the following symptoms appears among a number of workers so exposed, the association between such symptoms and such exposure would justify the industrial physician in suspecting lead as the causative agent in inducing these symptoms and would justify him in making a diagnosis of suggestive lead poisoning :

Constipation.
Loss of weight.
Loss of strength.
Drowsiness.
Pain in lumbar region.
Pain in joints.
Headache.
Insomnia.
Confusion.
Loss of morning appetite.
Metallic or sweetish taste.

Cases should be classified according to the above outline only after careful elimination of confusing conditions as shown in the history of the worker. Due emphasis must be given to the fact that although these workers are exposed to a lead hazard they are still equally susceptible to diseases and intoxications foreign to their occupation, and that certain of these produce symptoms identical with those of lead poisoning. For instance, a luetic person may complain of headache, joint pains, weariness, and may have arteriosclerosis with hypertension; or certain focal infections may give rise to symptoms simulating lead poisoning. Among women menstrual disorders or uterine displacement may cause constipation, headache, pain in abdomen, anaemia, etc. Nor do these few examples illustrate all the conditions which are apt to confuse the diagnostician in deciding the presence or absence of lead poisoning, for other associated processes producing vapors, fumes, gases, and metallic dusts may lead to symptoms resembling those of lead. On the other hand, the facts that these conditions exist does not exclude the suspicion of lead poisoning. The question whether these are caused by the occupation or are concomitant with it must be answered by careful deliberation of the previous history of the individual and by the physical and laboratory findings."

Proposed Standards for Diagnosis of Mild Forms of Lead Poisoning.—The standards which we propose in the light of our present knowledge for the diagnosis of early or mild and severe chronic lead poisoning among those recently exposed to lead are as follow :—

For the accurate diagnosis of early or mild chronic lead poisoning there should be present in every case a definite sign of a lead intake determined by the presence of a blue line or lead in the urine in an amount exceeding ·05 milligramme per litre, together with one or other of the following signs of intoxication :—

(i) The presence of stippled red cells to the number of over 500 per million red cells, with no other blood changes and with or without symptoms of lead poisoning;

(ii) The presence of stippled cells in number less than 500 per million red cells, with symptoms of lead poisoning;

(iii) The presence of stippled red cells with other blood changes such as changes in size or shape of red cells, polychromasia, reduction of haemoglobin to 80 per cent. or less, and reduction of red cells below 4½ million, with or without symptoms of lead poisoning;

The symptoms of mild lead poisoning are taken as abdominal pain, constipation, headache, debility and tremor.

Proposed Standards for Diagnosis of Severe Forms of Lead Poisoning.—For the accurate diagnosis of severe forms of chronic lead poisoning there should be present evidence of a lead intake, and one or more of the toxic episodes, as colic, palsy, encephalopathy, lead arthralgia. Stippling of the red cells may reasonably be expected in all when examined within a short time of exposure to lead intake and the onset of severe signs or symptoms. In the continued absence of stippled cells from the blood smear such cases can be accepted as lead poisoning only after a careful scrutiny of the other clinical facts, for the absence of this objective sign is rare at the critical period of the poisoning.

It is frequently difficult to separate the mild or early and the severe or late forms of lead poisoning. At any time in the course of a mild attack an onset of colic will result in severe lead poisoning, but for the onset of palsy a more prolonged exposure is required.

Section 9.—Sequelæ of Lead Poisoning.

To postulate that nephritis or arteriosclerosis will only follow in those lead workers who give a history of attacks of colic or of palsy is at best only an intelligent guess and in keeping with the fact that a history of typical colic or palsy proves that these individuals have been engaged in lead work. Such a position is tantamount to demanding a history of delirium tremens in a chronic drinker before relating an arteriosclerosis or nephritis to his liquor.

The incidence of nephritis and arteriosclerosis is high among lead workers. There is no shred of evidence that it follows only in frank cases of lead poisoning rather than in those cases with a history of prolonged lead intake and minor signs and symptoms of lead poisoning. *Prima facie* it might more reasonably be expected among this latter group rather than among those in whom a frank attack of colic or palsy has drawn attention to the danger of their trade. Certainly our examination of the urine of lead workers for the presence of casts leads us to believe that there is an early marked effect of lead upon the kidneys which is evidenced by the frequent presence of granular casts in those cases whose exposure to marked doses of lead has been short.

The evidence of renal efficiency tests is now being brought to our aid on this subject.

The statistics upon which S. A. Smith claims to have found a definite relationship of colic and palsy with nephritis and arteriosclerosis are unacceptable and have been criticised in our account of the Broken Hill investigations.

To sum up, our limited knowledge of the sequelæ of lead poisoning is no greater than when Legge and Goadby wrote :—" Unless it were established that granular nephritis were present in a lead worker before commencement of lead employment, we think it would be useless to endeavour to prove that the condition was independent of lead, despite its comparative frequency as a cause of death apart from employment."

With the present limited knowledge of the manner of onset of arteriosclerosis and nephritis among lead workers it is impossible to determine the cause and origin of such degenerative changes in a lead worker. It is comforting to the physician to know that there is a past history of colic or palsy in any individual adjudged to be affected by arteriosclerosis and/or nephritis caused by his work, but it is probably fallacious to think that such an easy means of selection picks out those affected by their trade from those whose inherited vascular make-up leads to early degenerative change.

With the exception of employees in those trades where the exposure to lead is minimal, any lead worker of some years standing who develops these degenerative changes with no cause apparent other than lead is entitled to benefit by the view that his trade was a material contributing factor to their onset and that the disease arose from his employment until such time as our knowledge of degenerative disease permits a more selective diagnosis.

SECTION 10.—NOTABLE INVESTIGATIONS CONCERNING PLUMBISM IN AUSTRALIA.

Apart from the recent Royal Commission on Plumbism in South Australia which has brought forward the importance of blood examinations in lead poisoning, and is chiefly of account from the work done by Mathew of the Commonwealth Health Laboratory, two investigations are noteworthy.

The first of these, and one which has not received the attention it merits, is the account by Brienl and Young (4) of the Australian Institute of Tropical Medicine, published in 1914, " On the Occurrence of Lead Poisoning amongst North Queensland Children." This investigation is worthy of its distinguished authors. We copy one section, as the information it contains is not readily accessible in text-books :—

" *Observations in Townsville.*—Opportunity offered itself in Townsville to observe cases resembling those described by Jeffris Turner, Lockhart Gibson, and others in children admitted to hospital.

" Unfortunately during the first three years no chemical analysis of the urine for lead could be carried out. As the characteristic signs of lead poisoning, the blue line on the gums and drop wrist, were only rarely met with, and in the first cases basophilic granulations in the erythrocytes, which are generally considered as characteristic of lead poisoning, were absent from the blood, considerable doubt was felt about lead being the etiology of the cases in question. The chemical analysis of the cases previously reported in the literature seemed incomplete, and, moreover, only in a few of the cases any reference at all was made to the presence of lead in the urine. Besides, no urine of normal children had been examined for the presence of lead, and in no case had any analysis of the fæces been made.

" The clinical symptoms alone were barely sufficient to warrant the diagnosis of lead poison, especially as our knowledge of the clinical picture of lead poisoning in children is very incomplete.

" Within the last year, however, the urine and fæces of a number of children clinically suspected as suffering from lead posioning have been examined chemically, and the results have proved beyond doubt that lead poisoning is not of uncommon occurrence among children. During 1913 the excreta of twenty-two children was examined for the presence of lead, and in eighteen of these lead was found in them in varying quantities.

" The symptoms observed corresponded on the whole to those previously described.

" The cases may be classed according to the severity of the symptoms. The very early cases have no definite symptom. Parents complain of a change in the character of the children within the last few years; whilst previously they have been normal and well behaved, lately they have become peevish and fretful, were very restless at night, and had lost their appetite completely. As a rule, only careful cross-questioning elicited the information that the child had been complaining of slight pains in the epigastrium and pains in the legs. The breath was often foul, and now and again ulceration was noticed in the mouth. According to the parents' statements, the children were flushed in their faces and appeared feverish. All the symptoms referred to are very indefinite, and may be considered as the commencement of any infectious disease.

" Even in these early cases lead can be found in the urine, often in appreciable quantities, and without the chemical analysis the correct diagnosis would be very difficult.

" In cases of slightly longer duration the pains in the abdomen, intermittent at first, have become more continuous. Constipation is the rule, but in rare cases a history of intermittent diarrhœa is given. Vomiting is only very rarely observed. The pains in the calf of the leg become more marked, the calf muscles are often so painful that the little patients cannot endure even the weight of the bed-clothes, and at this stage the gait of the child becomes affected. The Burtonian line was observed only in a small percentage of the children.

" A continuous line is not often found in children, but the characteristic minute black spots occur round teeth, which are coated with a deposit of tartar, requiring the use of a hand lens for their diagnosis.

" Many of the cases showed foot and wrist drop. As pointed out by other observers, certain nerves of the legs as a rule are affected first, thus differing from the clinical system of lead poisoning in adults, where drop-foot is but rarely present.

" The extensors of the toes and the peronei muscles are most frequently involved, the patients have a characteristic gait; they walk on the outside of their feet, the gait is high stepping, the toes drag along the ground, and at each step the leg is swung sideways, before again being put down to the ground.

" Drop-wrist due to a paralysis of the extensor communis digitorum is not rare. In two advanced cases the Aran-Duchenne type of paralysis was present, in which the muscles of the thenar and hypothenar eminences and the interossei showed marked atrophy. In the majority of cases with nervous symptoms a slight atrophy of the muscles in question is noticeable.

" The eye symptoms described by Lockhart Gibson were only present in one of the twenty-two cases examined. This child complained of dimness of vision, but an examination of the fundus was impossible on account of the restlessness of the child.

" *Brain symptoms* are common, ranging from an obstreperousness and fretfulness to a state resembling mania. As already remarked, the parents invariably complain of a marked change in the character of the previously well-behaved children. In two extreme cases the children have become quite unmanageable since their illness; they screamed day and night, and kicked at everybody that came near them, shortly after their removal from home, and after vigorous treatment with potassium iodide, these children again became quite normal. Not rarely convulsions are the outcome of chronic lead poisoning in children, but these do not differ in any way from convulsions due to other causes, except in their severity. Albumin was not found in the urine in any of the cases. The body temperature is often normal throughout, sometimes irregular, but very rarely rising above 101° F.; the pulse rate is invariably hard in spite of normal temperature.

"Anæmia is only marked in cases of long standing. Blood counts in early cases reveal normal conditions; in chronic cases the number of red cells may be diminished; the lowest count gave 3,000,000 red blood corpuscles with a hæmoglobin of 9·34 grams in 100 ccm. blood.

"Basophilic granulations in a small number of erythrocytes were found in the majority of cases, sometimes only after a prolonged search."

(They also give analyses for lead in the excreta of sixteen children, which in some cases were repeated. The urinary excretion in children aged from 3 to 14 years was from 0·18 mgm. per litre to 0·69 mgm. per litre.)

Technical Commission of Inquiry at Broken Hill.—During the year 1919–21 a Technical Commission of Inquiry medically and radiographically examined the miners at Broken Hill seeking evidence of the hazards of dust and lead poisoning. Portion of the results of this inquiry was published in 1921 and the final results were summarised in 1922 (20) (21).

The Broken Hill silver lead mines are situated in the extreme western border of the State of New South Wales, some 600 miles from Sydney. The chief lode is a galena, but this ore body has become oxidised in its more superficial layers, and these oxidised portions contain lead carbonate and lead oxide. In the early days when the chief mining was done in the carbonate ore numerous cases of lead poisoning occurred. Dr. J. Bartley, resident surgeon, Broken Hill Hospital, Australia, in the *Lancet*, 23rd May, 1891, says: "That at the lead mines at Broken Hill the miners are very susceptible to lead poisoning, often in a very severe form, more generally colic, but not unfrequently coma and epileptiform convulsions."

But since the great bulk of ore extracted has been sulphide containing an average of 15 per cent. of lead, lead poisoning has become uncommon, and the so-called acute cases are restricted to men working in smaller mines exposed to carbonate dust. This Commission of Inquiry found that sixty-one men were lead poisoned. Very little information has been published regarding these men; their ages, the mines at which they work, their exposure to the highly toxic carbonate dust, have not been recorded. To gain knowledge of this inquiry it is necessary to read the evidence given before various public bodies or Commissions.

Finlayson (23) says: "The Board has dealt with very few cases that are not chronic. The great majority are men who have had a long exposure, having been exposed to carbonate ores in their earlier days before sulphides were worked. . . . Cases that we have seen have been lengthy, men with a long exposure who have been previously affected by acute or sub-acute lead poisoning, and who since that time have been more or less continuously exposed to the risk of lead poisoning."

Chapman (23) says: "The Broken Hill cases of lead poisoning form two groups. Firstly, there was a group consisting of about half of the persons considered to be suffering from lead poisoning, who gave a history of having suffered from repeated attacks of colic, ranging mainly from fifteen to twenty years previously, who gave a history of having suffered from definite paralysis of the type recognised to be due to lead, and thirty-one of thirty-five, of whom at the time we examined them showed evidence of that paralysis in their body, who were under weight, who showed pallor and earthy tint associated with lead poison, who showed signs of malnutrition in the absence of subcutaneous fat, and who suffered in varying degrees, but not all of them, from headaches, giddiness and tremor, and some of them also from Bright's disease. These represented the first group, that is, persons who had in their bodies undoubted signs of having had previous lead palsy, and who suffered from this condition of malnutrition. In addition, there was another group of persons showing a long history of colic, which, in many cases, was checked by evidence that they had been in hospitals suffering from colic for weeks and months, but no history of ever having had nervous paralysis or paresis. They also suffered from pallor and anæmia, showed the earthy tint, showed this peculiar cachexia, malnutrition, absence of subcutaneous fat, and some of them suffered from headaches, giddiness, fibrillary tremor in the muscles, general muscular wasting, loss of weight for their height, and about 50 per cent. of them had Bright's disease, showing various signs such as raised blood pressure, thickened arteries, retinal hæmorrhage, and so on. Those constituted the second group. All these men were over 40 years of age."

Recently S. A. Smith (22) used data concerning the incidence of arteriosclerosis among Broken Hill miners obtained by the Commission of Inquiry to contrast with the incidence of arteriosclerosis among sandstone miners, and drew the inference that "the absorption of small doses of lead does not produce arteriosclerosis or renal disease without at the same time producing other manifestations of lead poisoning." He used lead colic and extensor paresis as examples of the other manifestations. This matter assumes grave importance when it is pointed out that from the clinical findings of men exposed to a surmised daily intake of 1 to 2 mgms. of lead sulphide, definite conclusions were drawn regarding the onset of arteriosclerosis among all lead workers; for lead sulphide is regarded as one of the least toxic of all lead compounds.

The alleged facts upon which S. A. Smith bases his opinion on the causation of lead poisoning at Broken Hill are—that it has been found that miners were exposed to the action of lead as, according to the 1922 report, in the urine of every one of 209 working miners lead was found, and the amount was later stated by Chapman to be from ·12 mgm. to ·8 mgm. per diem.

We have hesitation in accepting the accuracy of these lead in urine analyses for the following reasons:—(1) No details have been published concerning these analyses and they were probably made in a lead-containing atmosphere. (2) The amount of lead reported was such that it is only reasonable to expect that punctate basophilia of the red cells and the lead line would be commonly found; but basophilia was said not to exist by Chapman and to be rare by S. A. Smith, and the lead line to be a rarity by Finlayson (23).

Before S. A. Smith's views can be considered we think that there should be confirmation of the statement that the Broken Hill miners generally excrete such amounts of lead, and that the amount of work done by the sixty-one miners when exposed to carbonate dust should be determined.

It is a matter of common knowledge that lead carbonate readily causes lead poisoning and that lead sulphide is a rare cause. Statistics drawn from a mixed group of miners, part of whom have been exposed to lead sulphide only and part to lead carbonate and lead sulphide, will not in our opinion give trustworthy results, and it will be inequitable to apply them to lead workers generally.

Chapman's opinion that when an individual absorbs an amount of lead between 1 to 2 mgms. per diem the form of the lead compound makes no difference to the condition of the worker, is one which will not find acceptance among English and American authorities; even in his investigations no man was found with lead poisoning under the age of 40, and many of the signs and symptoms were related to work in the carbonate ore. Lead poisoning in the carbonate days was known to be rife, while the only so-called acute lead poisoning in Broken Hill of recent years occurred in men working in carbonate ore. His statement, if a fact, would render almost worthless the large amount of work done in the study of fritted glazes.

But only by believing this thing " that the form of a lead compound when absorbed in doses of between 1 and 2 mgms. per diem did not matter," was it possible for S. A. Smith to put forth his article which will shortly be criticised. Chapman's picture of a special industrial type of lead poisoning among Broken Hill miners with an onset of twenty years is not clear; it is blurred by the shadow of the carbonate days.

The factors which determine lead poisoning at Broken Hill have been too variable to allow a pure special type of industrial lead poisoning to be made out.

The history of industrial conditions at Broken Hill is not a clear sheet, but rather a palimpsest.

S. A. Smith's attempt to show that the absorption of small doses of lead will not produce arteriosclerosis or renal disease without causing other manifestations of lead poisoning, probably could not be objected to were he to stress anæmia rather than such gross signs as a history of colic or the presence of extensor paresis. This attempt is worthy of notice if only to show clearly what slender grounds he has for making this important conclusion.

He takes a group at 1,410 Broken Hill miners (25 of whom had lead poisoning), 1,597 surface hands at Broken Hill mines (among whom the incidence of lead poisoning is not mentioned), and compares them with a group of 716 sandstone workers not exposed to lead.

He contrasts the incidence of arteriosclerosis and nephritis in these groups, subtracts the cases in which manifest lead poisoning is shown by colic or palsy, and finds that the incidence of arteriosclerosis and the nephritis in these groups is then more or less equal *in the later years*. This method of using percentage figures and not giving the group numbers of individuals dealt with conceals the very important fact that the number of miners between 40 and 60 is markedly reduced when compared with the sandstone and surface workers. S. A. Smith's deduction is built up on an " old guard " of thirteen men with lead poisoning and degenerative changes found among a rapidly dwindling group of older miners, all or some of whom faced the adverse conditions of the earlier days. In other words, this small group of miners is affected by two variables—personnel and conditions of work. The essence of the method depends on the distribution of arterio-renal disease. Had the thirteen miners with arteriosclerosis and lead poisoning in addition been six or eighteen, which is well within the range of probability, as he is dealing with twenty-five cases of lead poisoning, then it would not have been possible to attempt to show that the absorption of small doses of lead does not produce arterio-renal disease without at the same time producing other manifestations of lead poisoning as colic or extensor palsy.

An eminent English authority says that the tendency for arteriosclerosis and the nephritis to be present among any group with a lead risk is in direct proportion to the extent they suffer from lead poisoning, and the statistics brought forward by S. A. Smith go no further than this.

S. A. Smith has no evidence to show that the anæmia of lead poisoning, which so often is quite unsuspected by the individual affected, has not been the remote determining cause of the degenerate changes characteristic of the sequelæ of lead poisoning. From whatever angle this investigation is viewed this curious fact obtrudes—no man was found with lead poisoning under 40 years of age. This fact, coupled with the failure to find any basophilia at Broken Hill, will raise many doubts in regard to the standards of diagnosis employed there. The use of sandstone workers as a control group will not pass unchallenged, as nephritis is the cause of a high mortality in groups of workers exposed to a silica risk in England.

It should be noted that the degenerative disease among the sandstone workers under 40 was double that found in the Broken Hill workers. With such a marked discrepancy in the groups under 40, what value is to be attached to the comparative findings among the smaller groups above that age ? We must accept that S. A. Smith adopted suitable and consistent standards in these examinations, even if we regret the meagre information concerning them, and suggest with proper deference that a somewhat smaller blood pressure than that given as a standard in the text of the first Broken Hill report, and a detailed examination of the urine, might produce a very different series of figures.

Section 11.—Treatment.

The treatment of lead poisoning has been greatly modified by the work of Aub and his colleagues, and has changed from an almost empirical administration of potassium iodide to a reasoned exhibition of calcium to promote storage of lead in circulation, followed at a later date by the judicious use of such drugs as ammonium chloride, potassium iodide, or alkalies, with a view of eliminating lead from the tissues.

These authors state that with a quart of milk and 30 grains of calcium lacate daily, colic rapidly subsides, and in our hands similar results have been obtained. When the acute symptoms are quite clear, the use of drugs such as potassium iodide or ammonium chloride with a calcium free diet will mobilize the lead and cause elimination. Sodium bicarbonate is also recommended in large doses along with a calcium free diet.

APPENDIX 1, showing the following details:—Age, occupation, process engaged in, last exposure to lead in days, dates examined, basophilia, hæmoglobin, blue line, lead in urine and fæces, albumin, granular casts, Wassermann reaction and chief symptoms concerning patients who were examined and certified to be suffering from lead poisoning:—

Case No.	Age.	Occupation.	Process Engaged in.	Last Exposure to Lead.	Dates Examined	Basophilia.	Hb.	Blue Line.	Lead in Urine.		Lead in Fæces.		Albumin.	Granular Casts.	W.R.	Chief Symptoms, etc.
	yrs.			days.		per million red cells.	per cent.		mgm. per litre.	mgm. per 24 hrs	mgm. per 100 gms.	mgm. per 24 hrs.				
104	29	House painter ...	House painting...	75	1-7-25	...	...	...	0·03	0·03	...	...	...	...	...	
					25-8-25	Nil.	100	—	0·03	0·04	...	...	—	—	—	History of colic, gingivitis, tremor.
1	24	Motor car painter	Motor car painting.	150	30-4-25	Nil.	100	—	0·02	0·03	0·09	0·12	+	+	—	History of palsy left wrist and colic, debility, tremor, paresis of extensors.
					20-7-25	...	...	...	0·03	0·03	...	...	...	...	...	
					27-1-26	...	...	...	0·02	0·04	0·12	0·10	...	...	...	
					*29-1-26	...	...	...	0·02	0·02	0·40	0·30	...	...	...	29-1-26. Medication and diet.
					13-7-26	...	...	...	0·01	0·03	0·30	0·40	...	...	...	
43	29	Motor car painter	Motor car painting.	105	20-5-25	Sparingly	75	+	0·02	0·03	...	...	—	+	—	History of palsies and colic. Paresis, tremor and debility.
					16-7-25	...	...	...	0·07	0·14	0·75	0·38	...	...	...	
54	51	Motor car painter	Motor car painting.	1	21-5-25	1,000	75	+	0·03	0·03	...	...	—	+	—	Arteriosclerosis, chronic nephritis
105	30	White-lead worker	Stripping ...	300	29-5-25	Nil.	...	—	0·04	0·04	...	...	—	—	—	History of colic and paresis.
106	38	Tinner	Tinning	43	23-6-25	1,000	90	—	0·07	0·07	...	...	—	—	—	Abdominal pain, tremor and paresis.
					7-7-25	Nil.	...	...	0·09	0·09	...	...	...	...	...	
					4-9-25	...	...	...	0·08	0·12	0·28	0·18	...	...	...	
					10-11-25	...	...	...	0·20	0·20	0·15	0·15	...	...	...	
					20-4-26	...	...	...	0·15	0·22	0·95	0·62	...	...	...	
					21-4-26	...	...	...	0·15	0·18	0·23	0·15	...	...	...	
					25-6-26	...	...	...	0·20	0·22	0·67	0·47	...	...	...	
107	22	Coach painter ...	Painting safes ...	1	24-8-25	1,000	75	+	0·50	0·62	11·8	20·0	—	+	—	Colic and headache, gingivitis.
					9-9-25	1,000	...	...	0·12	0·18	0·85	1·45	...	...	...	
					17-9-25	1,000	...	...	0·25	0·25	0·54	0·60	...	...	...	
					1-10-25	100	...	...	0·15	0·23	0·32	0·44	...	...	...	
					29-1-26	100	...	...	...	...	0·21	0·53	...	...	...	Fæces liquid.
					3-3-26	...	...	...	0·08	0·08	0·33	1·00	...	...	...	,,
					*26-3-26	...	...	...	0·05	0·06	0·34	0·50	...	...	...	26-3-26. Medication and diet.
108	63	House painter ...	House painting...	300	4-9-25	Nil.	85	—	0·04	0·03	...	...	+	+	—	Arteriosclerosis. Chronic nephritis. History of colic.
					13-1-26	...	...	...	0·03	0·02	...	...	...	...	...	
					*24-1-26	...	...	...	0·02	0·04	0·26	0·57	...	...	...	24-1-26. Fæces liquid. Medication and diet.
109	18	Accumulator manufacture.	Trimming after formation.	43	22-9-25	100	65	+	0·20	0·15	0·90	0·45	—	—	—	Colic and debility.
110	43	Pottery manufacture.	Placer, gloss kiln	3	22-9-25	Sparingly	100	—	0·08	0·09	0·35	0·70	+	—	—	Complains of abdominal pain and debility.
111	50	White lead worker	Smelting ...	7	28-9-25	100	75	+	0·05	0·07	0·44	0·53	—	+	—	Abdominal pain.
32	41	Motor car painter	Motor car painting.	7	7-10-25	Nil.	90	+	0·12	0·12	...	...	—	—	—	Abdominal pain, pallor. Red cells 44.
112	30	Painter	Spray painting...	3	26-10-25	Nil.	100	—	0·10	0·25	0·27	0·38	—	—	—	Colic.
					18-3-26	...	...	...	0·08	0·13	0·38	0·48	...	...	...	
					20-5-26	...	...	...	0·04	0·07	...	...	...	...	...	
					26-7-26	...	...	...	0·05	0·09	...	...	...	...	...	
113	55	House painter ...	Preparing colour cards.	90	28-10-25	Nil.	80	—	0·15	0·22	0·13	0·30	+	+	—	History of colic, 1921. Arteriosclerosis. Cerebral Thrombosis (?) Medication and diet, 11-3-26.
					2-3-26	...	...	...	0·06	0·07	0·15	0·50	...	...	...	
					*11-3-26	...	...	...	0·03	0·06	0·16	0·30	...	...	...	
114	27	Painter	Ship painting ...	14	4-11-25	1,000	75	+	0·10	0·10	0·48	0·60	+	+	—	Red cells 40. Colic. Pains in limbs. Debility.
115	19	Glass manufacture.	Mixing raw materials (including red lead).	35	2-11-25	100	60	+	0·04	0·09	0·50	0·25	+	—	—	Red cells 36. Marked changes in size and shape. Colic, debility, pallor.
				...	22-1-26	Nil.	80	...	0·15	0·03	0·40	0·50	...	...	...	
				...	19-3-26	Sparingly	...	...	0·08	0·14	0·20	0·25	...	...	...	
				...	27-4-26	Nil.	100	...	0·06	0·15	0·75	0·75	—	—	—	Red cells 55.
116	25	Shot manufacture	Smelting and dropping.	54	2-2-26	Nil.	100	+	...	...	...	...	+	+	—	Red cells 50. History of colic. Debility.
117	32	Motor-car painter	Finishing and rubbing down.	9	4-3-26	Sparingly	100	—	0·13	0·10	1·00	1·50	—	—	—	Abdominal pain, headache, debility. Red cells 50.
118	40	Pottery manufacture.	Dipper's assistant.	30	4-3-26	Nil.	75	—	0·11	0·08	...	...	...	...	...	Colic, constipation. Red cells 43.
119	37	Tinsmith	Soldering ...	15	29-4-26	Nil.	100	—	0·06	0·06	...	...	—	...	—	Extensor palsy left wrist and left deltoid.
					17-5-26	...	...	...	0·10	0·13	0·13	0·13	...	...	...	
120	42	Carriage builder ...	Altering old carriages.	4	3-5-26	10,000	80	+	0·10	0·16	...	...	...	...	...	Colic, vomiting, headache.
				...	3-6-26	5,000	...	...	...	...	...	...	...	...	...	
121	31	House painter ...	House painting...	7	14-5-26	1,000	100	+	0·12	0·14	...	...	—	—	...	Abdominal pain, headache, pallor, debility.
					21-5-26	10,000	100	+	...	...	...	...	...	...	...	
					26-7-26	100	70	+	0·37	0·25	13·6	24·5	...	...	...	
					11-8-26	80	...	...	0·20	0·20	...	...	...	...	...	
122	42	Rubber worker ...	Mixing mill ...	30	29-1-26	Nil.	50	—	0·10	0·15	...	...	+	—	—	Arteriosclerosis, debility, anæmia. B.P. 175-120.
					19-2-26	...	...	...	0·04	0·10	...	...	...	...	...	
					2-3-26	...	...	...	0·03	0·05	0·20	0·60	...	...	...	Red cells 35.
					17-5-26	...	...	...	0·04	0·10	0·25	0·13	...	...	...	
					2-7-26	...	...	...	0·04	0·06	...	...	...	...	...	
123	21	Accumulator manufacture.	Pasting	6	8-6-26	40,000	55	...	0·53	0·40	2·35	1·40	...	...	...	Colic epigastric. Red cells 32. Change in size and shape. Polychromasia, megaloblasts.
					19-7-26	4,000	...	...	...	...	...	...	...	...	...	
					27-7-26	1,000	...	...	0·13	0·15	1·10	1·00	...	...	...	15-7-26. Red cells 38. Hb. 60. Polychromasia, megaloblasts.
					16-8-26	800	...	...	...	...	...	...	...	...	...	21-7-26. Red cells 48. Polychromasia.
124	18	Compositor ...	Hand composing	50	24-6-26	Nil.	100	—	0·03	0·08	0·09	0·10	+	—	...	Pallor, history of abdominal pain, constipation, albuminuria.
125	50	Painter	House painting	4	1-7-26	1,000	85	+	0·07	0·06	...	...	+	+	—	Red cells 47. History of colic and palsy, mental instability.
126	23	Accumulator manufacture.	Mixing	25	16-8-26	200	100	+	0·10	0·11	0·33	0·10	—	+	...	Red cells 54. Pallor, history of colic.
127	46	Painter	House painter ...	130	23-8-26	Nil	100	—	0·20	0·34	0·24	0·42	+	—	—	History of colic.
128	37	Accumulator manufacture.	Trimming and burning.	4	7-11-25	4,000	80	—	0·09	0·22	0·27	0·30	+	—	—	Red cells 45. Colic, headache, debility.
129	42	†Motor car painter	Motor car painting.	90	11-5-25	Nil.	100	+	0·10	0·10	...	...	+	+	—	Complained of abdominal pains and debility. History of colic, arteriosclerosis, chronic nephritis.
					10-12-25	...	...	...	0·08	0·08	0·03	0·04	...	...	...	
					29-12-25	...	...	...	0·05	0·08	0·21	0·34	...	...	...	
					8-6-25	...	...	...	...	...	0·60	0·25	...	...	...	Lead in tissues given below.
					8-5-26	Died.	...	...	...	...	...	...		...	...	
130	26	Vitreous enamelling.	Enamelling baths.	1	9-3-26	6,000	100	...	0·35	0·15	1·65	3·65	—	—	...	Red cells 43. Abdominal pain.
					22-3-26	Sparingly	...	...	...	...	...	...	...	...	...	
					12-4-26	Nil.	...	...	...	...	...	...	...	...	...	
131	26	Painter	House painting...	5	28-7-26	750	100	+	0·45	0·32	...	...	...	...	...	Colic, debility, headache.

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* Urine and fæces tested after medication with ammonium chloride and calcium free diet.

† The following pathological details are available:—Lead in tissues, case 129—Kidney, 0·11 mgm. lead per 100 gm. tissue; liver, 0·25 mgm. lead per 100 gm. tissue; brain, 0·10 mgm. lead per 100 gm. tissue; lung, 0·06 mgm. lead per 100 gm. tissue; sternum, 0·07 mgm. lead per 100 gm. tissue; heart, 0·13 mgm. lead per 100 gm. tissue.

Appendix 2, showing the following details :—Age, occupation, process engaged in, last exposure to lead in days, dates examined, basophilia, hæmoglobin, blue line, lead in urine and fæces, albumin, granular casts, Wassermann reaction, and chief symptoms concerning patients who were examined and were not certified to be suffering from lead poisoning.

Case No.	Age.	Occupation.	Process Engaged in.	Last Exposure to Lead.	Dates Examined	Basophilia.	Hb.	Blue Line.	Lead in Urine.		Lead in Fæces.		Albumin.	Granular Casts.	W.R.	Chief Symptoms.
	yrs.			days.		per million red cells.	per cent.		mgm. per litre.	mgm. per 24 hrs.	mgm. per 100 gms.	mgm. per 24 hrs.				
132	68	Compositor ...	Composing ...	30	2–6–25	Nil.	90	—	0·02	0·02	...	...	+	+	—	Arteriosclerosis. B.P. 240.
133	63	Compositor ...	Sawing type metal.	365	27–7–25	Nil.	...	—	0·03	0·05	...	...	+	—	—	Debility and insomnia.
					4–8–25	...	...	...	0·02	0·04	...	...	...	...	...	
					18–8–25	...	...	...	0·08	0·15	0·12	0·36	...	...	...	19–8–25 to 21–8–25. Medication and diet.
					*19–8–25	...	...	...	0·04	0·09	0·06	0·20	...	...	...	
					*20–8–25	...	...	...	0·04	0·06	0·09	0·30	...	...	...	
					*21–8–25	...	...	...	0·07	0·14	0·08	0·26	...	...	...	
134	38	Sheet metal worker.	Sheet metal work.	1	3–9–25	Nil.	100	—	0·04	0·03	0·20	0·36	—	—	+	Pulmonary tuberculosis.
135	55	Wire-netting weaver.	Wire-netting weaving.	14	8–9–25	Nil.	100	—	0·04	0·10	0·30	0·24	...	...	—	Tremor and debility.
136	30	Painter	House painting...	1	16–9–25	Nil.	100	—	0·08	0·09	0·56	0·56	—	—	—	Debility and tremor.
137	36	Sheet metal worker.	Soldering ...	6	29–10–25	Nil.	...	—	0·10	0·12	...	...	—	—	+	Bismuth present. Abdominal spasms, headaches.
138	43	Coppersmith ...	Plumbing ...	10	18–11–25	Nil.	100	—	0·02	0·02	...	...	—	—	...	Lassitude.
139	48	Plumber	Plumbing ...	3	20–12–25	Nil.	100	—	0·15	0·15	...	...	—	—	—	Complained of debility.
140	59	Painter	House painting...	5	23–12–25	Nil.	100	—	0·03	0·06	0·42	0·15	—	+	...	Arteriosclerosis; alcoholism.
141	37	Rubber manufacture.	Dry mixing ...	7	15–1–26	Nil.	100	—	0·06	0·06	0·13	0·23	—	—	—	Red cells 50, debility. Fæces liquid.
142	53	Painter	House painting...	7	29–1–26	Nil.	100	—	0·05	0·05	...	...	...	...	...	Pains in shoulder.
143	35	Compositor ...	Composing ...	1	8–2–26	Nil.	90	—	0·04	0·06	0·23	0·25	...	...	...	Headaches, debility.
144	48	Machine operator	Stamping electro-plate.	84	12–2–26	Nil.	100	—	0·10	0·10	...	...	...	...	...	Gastric ulcer.
145	65	Painter	General painting	4	12–2–26	...	100	—	0·04	0·08	...	...	+	—	...	Arteriosclerosis.
146	40	Painter	General painting	1	13–2–26	...	85	—	0·02	0·05	...	...	+	+	...	Arteriosclerosis, gout.
147	29	Tinsmith	Soldering ...	1	24–2–26	Nil.	100	—	0·07	0·06	0·12	0·15	—	—	...	Abdominal pains.
148	15	Painter	Painting agricultural machinery	21	19–3–26	Nil.	100	—	0·40	0·40	...	...	...	...	...	Abdominal pain.
149	37	Painter... ...	Ship-painting ...	Not known	12–4–26	Nil.	100	—	0·07	0·08	0·07	0·20	...	...		Debility.
150	36	Painter	Spray painting ...	49	19–4–26	Nil.	...	—	0·02	0·02	0·11	0·30	...	...	...	Malignant growth of testicle.
151	44	Sheet metal worker.	Soldering ...	1	5–5–26	Nil.	100	—	0·05	0·04	0·05	0·05	—	—	...	Abdominal pain.
152	26	Accumulator manufacture.	Assembling ...	28	10–6–26	Nil.	100	—	0·03	0·07	0·28	0·42	—	—	...	Abdominal pain.
153	57	Coach painter ...	Coach painting	1	13–1–26	Nil.	100	—	0·11	0·10	0·32	0·25	—	—	—	Red cells 50. Abdominal pain.
154	...	White lead works..	Fitter's assistant	1	30–6–26	Nil.	100	—	0·05	0·07	0·65	0·65	—	—	—	History of extensor palsy left hand.
155	43	White lead works..	Smelting ...	4	19–7–26	Nil.	100	—	0·04	0·06	0·14	0·23	—	—	—	Abdominal pains.
156	45	Painter...... ...	House painting...	1	26–7–26	Nil.	100	—	0·04	0·05	...	...	...	...	—	Neuritis both arms.
157	21	Accumulator manufacture.	Moulding ...	21	27–7–23	Nil.	100	—	0·05	0·13	...	...	...	...	...	Pleurisy, abdominal pains.
158	38	Painter	House painting...	7	12–7–26	Nil.	85	—	0·12	0·12	0·25	0·25	...	...	+	Cerebral syphilis.
159	40	Painter	House painting...	67	14–7–26	Nil.	100	—	0·05	0·07	0·35	0·10	—	—	+	Arteriosclerosis, bismuth line.

* Urine and fæces tested after medication with ammonium chloride and calcium free diet.

APPENDIX 3, showing results of Medical Examination of all the Employees working in an Accumulator Factory (excepting four away sick with Lead Poisoning).

No.	Age.	Period in Trade.	Process now at.	R.C. Count.	Hb.	Punctate Basophilia.	Blood Picture.	Lead in Urine.		Albumen.	Granular Casts.	Blue Line.	Symptoms Complained of.	Remarks.
	yrs.	yrs.			per cent.	per million.		Mgm. per litre.	Mgm. per 24 hrs.					
160	18	3/52	Formation hand......	4,750,000	100	1,000	No changes	0·08	0·06	—	—	—	Abdominal pain ...	Handles formed plates only.
161	33	1	Group burning	4,790,000	70	4,000	Anisocytosis; poikilocytosis; polychromasia—marked; hæmoglobin reduced.	0·53	0·23	—	+	+	Pallor.	
162	19	¼	Moulding	4,960,000	100	160	No changes	0·12	0·15	—	—	—	Abdominal pain, pallor.	
163	21	1½	Formation burning	4,700,000	90	600	Anisocytosis; polychromasia.	0·26	0·34	+	—	—	Abdominal pain ...	1¼ years moulding previously.
164	14	¼	Trimming	....	100	1,000	Hæmoglobin reduced	0·40	0·53	+	+	—	Headache, abdominal pain.	
165	18	1¼	Moulding	5,150,000	100	800	Anisocytosis; polychromasia; hæmoglobin reduced.	0·24	0·23	—	+	—	....	
166	50	6/52	Group burning	....	100	Nil.	No changes	0·30	0·38	—	—	—	....	Lead burning for 20 years, 7 years ago.
167	32	17	Assistant foreman	5,030,000	100	200	No changes	0·04	0·07	—	—	—	....	
168	28	½	Formation burning	....	90	6,000	Anisocytosis; poikilocytosis; polychromasia advanced.	...	...	—	—	—	Abdominal pain.	
169	21	4½	Group burning and assembling.	5,000,000	90	2,000	Anisocytosis; poikilocytosis; polychromasia marked; hæmoglobin reduced.	...	...	—	+	—	Abdominal pain, pallor.	
170	19	2¼	Group burning and assembling.	....	100	250	Abnormal mononuclear forms.	...	...	—	+	—	....	
171	20	4/12	Group burning and assembling.	....	90	200	Anisocytosis............	...	...	—	—	—	Abdominal pain.	
172	21	1	Clerk	5,000,000	100	40	Polychromasia..........	...	...	—	—	—	....	Works near group burners.
173	23	1¼	Pasting	3,800,000	75	2,000	Anisocytosis; poikilocytosis, polychromasia.	...	...	—	+	—	Pallor, palpitation.	
174	14	½	Assembling	4,940,000	80	4,000	Polychromasia advanced.	...	...	—	—	+	....	No burning.
175	18	3/52	Trimming	....	100	2,000	No changes	...	...	—	+	+	Adbominal pain.	
		6/52	Trimming	....	...	800	....	...	...	...	...	...	....	
176	19	4/52	Trimming	4,700,000	80	8,000	Anisocytosis	0·15	0·18	—	+	+	Abdominal pain, headache.	
		7/52	Trimming	3,000,000	70	3,000	Poikilocytosis advanced; polychromasia advanced; hæmoglobin reduced; mononuclear leucocytosis.	...	...	...	...	+	Abdominal pain, headache.	
177	19	¼	Moulding	5,600,000	100	80	No changes	...	...	+	+	—	Abdominal pain.	
178	25	1	Pasting	4,100,000	100	4,000	Polychromasia..........	0·15	0·34	—	+	—	....	Was mixing for nine months.
		(3 weeks later.)	Pasting	4,000,000	80	4,000	....	...	...	...	...	—	....	
179	43	2½	Charging batteries	3,700,000	85	4,000	Anisocytosis; poikilocytosis; polychromasia advanced; hæmoglobin reduced.	...	...	—	—	+	....	
180	18	4/12	Formation hand.....	....	90	4,000	Polychromasia; mononuclear leucocytosis.	...	...	+	+	—	....	Handles pasted plates.
181	41	½	Moulding	3,900,000	85	1,000	Polychromasia..........	...	...	—	+	—	....	
182	55	6/52	Formation hand.....	....	90	1,000	No changes	...	...	—	+	—	....	Handling pasted plates.
183	28	3½	Assembling	4,600,000	100	4,000	Anisocytosis; polychromasia advanced.	...	...	—	—	+	....	Very little burning.
184	18	1¼	Moulding	....	90	40	No changes	...	...	—	—	—	....	
185	21	1½	Foreman in formation room.	....	90	120	No changes	...	...	...	...	—	....	
185	22	2/52	Formation burning	....	100	Nil.	No changes	...	...	—	—	—	....	
187	18	1/52	Trimming	....	100	40	No changes	...	...	—	—	—	....	
188	18	¼	Moulding	5,000,000	90	1,000	Hæmoglobin reduced	...	...	—	—	—	Abdominal pain.	
189	19	5/12	Moulding	....	100	400	Anisocytosis; polychromasia.	...	...	...	...	—	....	
190	20	½	Mixing	....	100	Nil.	No changes	...	...	—	—	—	....	6 months in formation room; 1 week mixing.
191	20	2	Trimming in machine press.	4,350,000	100	1,000	Anisocytosis; poikilocytosis; polychromasia; hæmoglobin reduced.	...	...	—	—	+	....	
192	19	1	Assistant storeman	....	100	....	....	...	...	—	+	...	....	6 months trimming.

APPENDIX 4.

STAINING METHODS USED FOR DEMONSTRATING PUNCTATE BASOPHILIA.

BY GIEMSA.

Preparation of Stain.—The Giemsa solution is made up by dissolving Giemsa powder (May and Baker Limited) in methyl alcohol in the proportion of 0·4 grm. of powder per 100 c.c. of methyl alcohol.

Fixing.—Fix for 15 minutes in equal parts of methyl alcohol and ether.

Staining.—The 0·4 per cent. Giemsa solution is diluted with about ten parts of distilled water.

The smear is then flooded with the diluted stain and left covered until it becomes coloured a faint pink when examined against white background. About 20 minutes staining will produce this colour but the progress of staining can easily be determined at any time by blowing lightly upon the flooded slide which will expose a small portion and enable the examiner to see the depth of staining reached.

After staining, the slide is washed in ordinary tap water and dried between blotting-paper.

BY SELLAR'S FLUID.

Preparation of stain.—Sellar's Fluid consists of methylene blue 1 grm., sodii bicarb. 6 grm., distilled water 200 c.c.

Fixing.—Fix in Absolute Alcohol for 20 minutes or in Methyl Alcohol for 3 minutes and allow to dry in air.

Staining.—Staining is conveniently carried out in a stoppered jar containing sufficient of the above preparation to cover the slides when they are placed in it.

The fixed slide is allowed to remain in the fluid for half a minute, when it must be removed and immediately washed with tap water until it becomes a faint greenish colour.

The chief thing to guard against in this method is over staining.

It will be found by comparison that there is little to choose between these two methods. We prefer staining by Giemsa as it shows polychromasia if present and gives a better differentiation than methylene blue, making it easier to detect stippling.

APPENDIX 5.

A STATISTICAL NOTE ON CERTAIN FIGURES PUBLISHED BY S. A. SMITH CONCERNING THE BROKEN HILL MINERS.

We are indebted to Mr. D. T. Sawkins, M.A., F.S.S., Statist to the Industrial Commission of New South Wales and Lecturer in Statistics and Geodesy in the University of Sydney, for the following comments :—

The group Y with which he deals may be regarded as men with manifestations of lead-poisoning and the group y as men without manifestations of lead-poisoning, X being the number of men with arterio-renal disease and x those without it..

"I have carefully looked through the statistical arrangements used by Dr. S. A. Smith in his paper entitled 'Some Aspects of Lead Absorption' in M.J.A., 26th September, 1925, as you asked me to do."

In order to simplify matters for myself I have thought of boys in three schools—A, B, and C. In A no green fruit was eaten, in B small quantities of green fruit were eaten, in C large quantities of green fruit were eaten, and the boys were classified according to the following scheme :—

X means the number of boys with appendicitis.
x means the number of boys without appendicitis.
Y means the number of boys actually seen putting green fruit into mouth.
y means the number of boys not actually seen putting green fruit into mouth.
XY means the number of boys with appendicitis and actually seen putting green fruit into mouth, etc.

I will suppose that the following statistics were carefully recorded :—

School.	xy.	Xy.	xY.	XY.
A.	360	25	0	0
B.	480	33	2	3
C.	240	16	12	13

Now, in this table, the ratio of xy to Xy is the same or approximately the same for the three schools, and further cases of appendicitis occurred not always when but only when the victims had actually been seen putting green fruit into their mouths. However doubtful such a proposition might seem *a priori*, there is no avoiding the definite indication of these figures that there is is an association between "appendicitis" and "actually seen putting green fruit into the mouth." If, however, in school C. xY had been 60 instead of 12, and XY had been 4 instead of 13, association would not have been indicated, for the proportion with "appendicitis" would have been the same amongst the "seen" as amongst the "not seen" in the three schools.

One question which remains is whether the samples recorded by S. A. Smith are large enough. In the first figure-column of his Table II there are three percentages, viz., 5·3, 2·4, and 3·0, the differences of which are not regarded as important; they are all, it seems, regarded as near enough to some norm percentage contemplated.

In other words a range of 2·9 per cent. among norm observations got with samples ranging from, say, 300 or 400 in the first to 1,200 or 1,000 in the second and third rows is tolerable. Perhaps the norm is near about 3 per cent. and the large deviation of the "Sandstone" men is a chance occurrence due to the comparatively small sample of 300 or 400. Another batch of "Sandstone" men equal in number might have given say, 1·3 per cent. As the reliability of a percentage derived from a sample varies as the square root of the size of the sample, the percentages in this first-figure column are by no means inconsistent if we accept that the order of their reliability is such that a deviation of say, 2·3 per cent. from the norm can occur as readily as it did occur in the case of a sample of 300 or 400.

In the case of a sample of 200 possessing reliability of the same order it would be fair to say that a deviation of $2{\cdot}3 \times \sqrt{2}$, *i.e.*, about 3 per cent., would occur as often as a deviation of 2·3 per cent. in a sample of 400.

Now let us take the second and third figure-columns of Table II, which either in combination or separately may be regarded as corresponding to percentages derivable from the first and second figure-columns of my hypothetical table of school boys. What is the size of the samples from which the percentages are derived ? S. A. Smith would, perhaps, be able to supply the numbers if he has kept the original and intermediate arrangements of the data. It can be shown, however, by algebra, if the percentages given are correct to the place of decimals to which they are quoted, that the total number of "Broken Hill Underground" men examined, aged 40 and over and left in Table II, did not exceed approximately 250, and was probably about 200 made up of about 160 men aged 40 to 60 years and about 40 men aged 60 and over.

Now, our reasoning shows that a deviation of about 3 per cent. in the case of the sample of 160 and a deviation of about 6 per cent. in the case of a sample of 40 might be expected to occur as aften or as readily as the range of from 2·4 per cent. to 5·3 per cent. in the first column of percentages. That is to say, the normal percentages of "Broken Hill Underground" men" men in Table II may as readily be in the second figure-column 11 per cent. (or 5 per cent.) instead of 8 per cent., and in the third figure-column 10·6 per cent. (or 22·6 per cent.) instead of 16·6 per cent.

Of course the whole of my reasoning with regard to the sufficiency of the samples is based on the supposition derived from you that the three percentages in the first figure-column of Table II are three "shots" at the same norm, that is to say, that their range arises by chance solely out of the size of the samples used. It may be, however, that the relatively high percentages, viz., 5·3 per cent. among "Sandstone" men under 40 years is systematic or assignable to a cause or causes, and not to chance operating in an ordinary way in a small sample ("chance operating in an ordinary way" may be thought of as a multiplicity of small causes each with a small deviating power, positive and negative deviations being equally likely).

Data of a thousand or several thousand average men under 40 years, rather than three hundred or four hundred "Sandstone" men under 40 years would of course be more likely to provide a reliable norm percentage. But could such data be got ? There is no doubt but that comparative morbidity statistics suffer from a lack of the relatively good norms available for mortality comparisons."

SUMMARY.

A new chemical method for the determination of minute amounts of lead in urine is described, and it is claimed that it makes a distinct advance by its ease of manipulation and accuracy.

The effect of lead on the red-blood cells and on the kidney is discussed, and the results of the examination of employees in an accumulator factory is given in a tabulation with special attention to the blood examination.

The amount of lead excreted in the urine and faeces is shown for a large number of suspected lead-poisoning cases.

It is found that there is a normal excretion of lead in the urine of residents of Sydney, which is in the vicinity of 0·02 mg. per litre, and that lead commonly occurs in the faeces of individuals not suffering from lead-poisoning.

Various standards used for the diagnosis of lead-poisoning are mentioned, and standards are given which it is considered are justified in the light of our present knowledge.

Certain notable investigations into lead-poisoning in Australia are detailed and the standards used at the Broken Hill inquiry are criticised.

Tabulations are given showing the various clinical details recorded during the examination of suspected cases of lead-poisoning and of the lead present in various tissues of three individuals, one of whom died from chronic plumbism.

It is concluded that "With the exception of employees in those trades where the exposure to lead is minimal, any lead worker of some years standing, who develops degenerative changes, with no cause apparent other than lead, is entitled to benefit by the view that his trade was a material contributing factor to their onset, and that the disease arose from his employment, until such time as our knowledge of degenerative disease permits a more selective diagnosis."

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Studies in Industrial Hygiene No. 8.

Concerning a Sugar Dust Explosion which caused three Deaths.

By Charles Badham, B.Sc., M.B., Ch.M., D.P.H., Medical Officer of Industrial Hygiene, and C. F. Assheton, B.E., Engineer-Assistant to the Medical Officer of Industrial Hygiene, Department of Public Health, New South Wales.

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1. Introduction.

With the increase in the magnitude of industrial activities during the past half-century, dust explosions—at one time practically a hazard of industrial life confined to the Coal Mines—have become a grave source of danger in many industries where a carbonaceous dust is found in sufficient concentration.

The classical work of *Wheeler of the Home Office places our knowledge of the conditions favourable for dust explosions on a firm basis, and recently †Price and Brown and their colleagues of the Department of Agriculture of the United States have issued a fine monograph containing a compilation of modern knowledge of the theory and nature of dust explosions in the elucidation of which their work has so greatly aided.

To all those interested in dust problems in factories the following account should be of interest.

In the State of New South Wales the grave danger inherent in carbonaceous dust in suspension is not fully recognised and though we have fortunately been spared up till now serious disaster in our factories and silos, this good fortune will probably not continue.

Narrative.

On the morning of 23rd January, 1926, a severe explosion occurred in the sugar storage bins and the grading floor of the refinery of Colonial Sugar Refining Company at Pyrmont, Sydney.

At the time of the explosion three men were in close proximity to the seat of explosion, and a fourth was on a mezzanine floor some distance away. The three men were severely burnt and died in hospital, the fourth man was slightly burnt. The three men who died from the effects of the burns were the foreman (J. Waterson) and his two helpers (H. Edwards, and S. Johnson). From the evidence given in court at the Coroner's inquest it appears that Edwards was going down the manhole of a bin and that Johnson was in a bin, and the foreman (Waterson) was either looking down the manhole of a bin or the inspection hole of the dust extraction duct, the evidence not being clear on this point. The job these men were engaged in was cleaning out the sugar dust which lay in the large duct of the dust-collecting system, and which covered like a fall of snow the upper exterior part of the duct and the galleries which led round them. The evidence seems clear that Johnson was in the bin, and his job there was to clean out the accumulation of sugar that lay in the duct, and that Edwards was going down into the bin to assist him. The actions and positions of Waterson are not so definite; the evidence concerning these rests on his statements to three men who saw him in hospital. To one of them he said: "I was on top . . . I don't know any more about how it happened except that a flash came from the far corner." To another: "The light on my lead broke, there was a crash"; and to a third: "And to think I might have been the cause of it the globe broke."

Evidence was given that Waterson had obtained a portable light (without a cage) and a lead about half an hour before the explosion, and this lead was found attached to a light point near the exhaust fan in a position that would enable it to be used to inspect the duct through an inspection hole. Evidence was given that Waterson had used such a lead for inspecting the interior of the duct on previous occasions, and one man (Dalgarno) said that "I have never ever cleaned out that elbow without using a portable light; it is under the floor you use that light; I have broken two globes in one morning there with the portable light. I knew Stoddart broke a light there too, but I don't know of any others who have broken globes there. Whenever Waterson was with me he was the man who put the portable light into that place. There was only one place it was used, and that was close up to the fan on the intake side of it. When the globes broke nothing happened, I simply got the globes renewed. I broke the globe referred to while it was hanging in the pipe by hitting it with the scraper, and the other one I also broke in the pipe. The fan was going at the time and the light switched on. No one else was making a dust in the bin at the time. The second time I dropped the light and it broke the tip at the end of the globe. When I broke this light the grader was working, and the fan also, and the ordinary work was going on."

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* Wheeler, R. V.—Report to Home Office. Cd. 6662 (March, 1913).

† Price, Brown, Brown and Roethe—Dust Explosions: Theory and Nature of Phenomena, Causes and Methods of Prevention, 1922.

There is thus ample evidence that the highly dangerous practice of using unprotected electric light globes in a dust-extraction system was the common practice in this refinery.

The force of the explosion shattered the light domes and the enclosed globes in the ceiling of the bins, blew out a brick wall on the grader floor, and shattered two doors on the ground floor.

Notes of our investigation and report concerning the cause of this explosion are given, and an account of the experiments made in breaking electric light globes in a cloud of sugar dust, and there is also given a report submitted by Mr. C. W. R. Powell, the Company's scientific adviser. We recently inspected the storage bins when the graders were working, and from observation, guided by considerable experience in dust sampling, we can state that the amount of dust in the sugar bins while the graders are working is not sufficient to form a combustible cloud, there being but a faint haze in the storage bins so that the amount of dust present would only reach milligrammes per cubic metre.

The City Coroner returned a verdict that the three men had died from the effects of burns accidentally received. He said "that as far as the actual circumstances leading up to the explosion were concerned, there was a suggestion that Waterson made statements when apparently quite rational, that the lamp on his lead broke and an explosion occurred. He also said that he thought he might have been the cause of the disaster. There was also conflicting evidence of that in a statement that the lead would not reach the top of the manhole where Waterson evidently was. I am very much inclined to believe that he was using this light, and he did break a globe. Probably he pulled the lamp from the lead and created a spark which resulted in the explosion."

NOTES ON AN EXPLOSION IN THE STORAGE BINS OF THE COLONIAL SUGAR REFINING COMPANY, PYRMONT.

After having made a detailed examination of the storage bins and the dust-collecting system at the Colonial Sugar Refining Company's premises at Pyrmont, we have formed the opinion that the explosion which occurred there on 23rd January, 1926, was due to the combustion of the dust originally produced by the grading of sugar, and which consisted of practically pure sugar in very fine powder form and containing ·1 per cent. or less of moisture. Such a powder is one of the most readily combustible dusts found in factories, and the combustion under suitable circumstances takes place with explosive violence.

The main combustion of the sugar dust occurred, in our opinion, in the ducts of the dust collecting system of No. 4 bin, and in the bin itself, and from this bin the explosion was propagated through the dust-collecting apparatus, which consisted of a system of ducts arranged as indicated in the accompanying diagram, varying in diameter from 21 inches to 9 inches.

An examination of No. 4 bin showed that the conditions in this bin before the explosion were favourable for the initiation and spread of a considerable dust explosion. Of the bins, only Nos. 4 and 5 are so constructed that the aggregation of a considerable amount of highly-combustible sugar dust was possible. These bins contained in their upper parts the large main ducts of the dust-collecting system and a gallery round three sides. In No. 5 bin it was found that the sugar dust had recently been removed from the ducts and the gallery, but in No. 4 bin there was found a large accumulation of sugar dust, both in the ducts, on the gallery and railings, and on the upper surface of the ducts. This sugar dust was, we were informed, the accumulation of three months. In the ducts it averaged over 4 inches deep, and was up to 2 inches deep on the large lodgment area provided by the ducts, galleries and railings.

One or more of the men who lost their lives in this explosion was, we believe, engaged in the task of removing the sugar dust from the ducts of the dust-collecting system. We found by trial that a very heavy cloud of sugar dust was made in the ducts during the work of removing the accumulated sugar dust from the ducts, and that a great deal of the dust thus put into suspension was not removed from the ducts by the exhaust fan, but was re-deposited in the ducts nearer the exhaust fan, despite the fact that the air velocity in the ducts was 900 feet per minute. We were informed that the exhaust fan was running at the time of the explosion.

In No. 5 bin the sugar dust had been removed from the ducts, both inside and out, and from the galleries.

In No. 4 bin the dust had been removed only from two small portions of the ducts and the tools used in this job, an iron boiler scraper, a large iron screw, and a piece of galvanised iron, were found on the gallery or in the ducts.

From our examination we concluded that a combustion took place in the dust-collecting system of the dust which was being put into suspension by the cleaning out of the ducts, and the explosive violence of this combustion caused the dispersion of the loose dust in the ducts which was in turn ignited, its combustion taking place both in the ducts and around the duct openings into each bin.

Only in No. 4 bin is there any evidence of a general explosion in the bin, for in No. 4 bin part of the dust which had been allowed to accumulate on the ducts and on the gallery appears to have been dispersed by the explosion, and to have taken part in it. In the other bins an examination showed that the combustion of the sugar dust had occurred only round the duct openings. It would appear that the dust concentrations in the bins when the graders and dust collecting system are working is not such as to be combustible, for if it were so then a general combustion of sugar dust would have occurred in each bin.

Cause of the Explosion.

Given a suitable concentration of dust, which in our opinion only existed in the dust removal apparatus in No. 4 bin and in the feeders from the graders, the causes of the ignition of this dust must be looked for among the following agents:—

1. The use of naked lights for the purpose of examination of the ducts or while smoking.
2. Small scale fires from whatever cause, which might come in contact with the dust of the ducts.
3. Electrical sparks from various causes, the breaking of electric light bulbs, or the ignition of dust which had collected on electric light bulbs.
4. Sparks struck by the use of iron tools in cleaning out the ducts, or by foreign material striking the fan.
5. Static electrical discharge.

1. As regards this possible cause, there appears to be no evidence available that a naked light was at any time used, and all the reports received show that the danger of naked lights was well recognised and guarded against.

2. There was no evidence available to show that any small scale fire existed before the explosion.

3. *Electrical Sparks, &c.*—The electric motor driving the exhaust fan was well enclosed, and there appeared to be no other source of electrical sparks.

There appears to be evidence that one of the men engaged in the task of cleaning the ducts used as a means of illumination an electric light bulb attached to a flexible lead. Following the explosion, this lead was found attached to a light point near the fan, the socket was missing, and there was subsequently found in the duct on the scrubber side of the fan a lamp socket which was presumed to be the missing socket. There is also evidence that the workman who was using this light said that the explosion followed the breaking of the light bulb.

Certain difficulties present themselves to our minds in regard to this detail. These are occasioned by the fact that the light bulb was of little use for illuminating the duct in the position in which it is thought to have been used. The length of the lead may, however, have been lowered down the duct from an inspection hole near the fan and the globe broken when some distance within the duct. Certainly there is no evidence of any marked combustion of sugar within a few feet of the fan, but if this were the primary point of the ignition the combustion of the sugar dust may have proceeded from this point along the portions of the duct more remote from the fan.

It is considered that at the time the explosion took place one or more of the men was engaged in removing the dust from the ducts, an operation which produces a large amount of dust which is carried to the vicinity of the fan. The appended extracts from an authoritative publication by experts in dust explosions (" Dust Explosion," by Price, Brown, Brown and Roethe of the United States Department of Agriculture) show that the breaking of an electric light bulb is sufficient to ignite combustible dusts and actual instances where this has occurred are quoted.

4. Sparks struck by the use of iron tools and by foreign material striking the fan. There was no evidence of any combustion in the vicinity of the fan, which discounts this as a source of sparks.

The tools used to clean out the duct could produce a spark, and might cause the combustion of the sugar dust. Such implements are obviously unsuitable for this work, and their use is unlikely to have ever received the approval of responsible scientific officers of the company.

5. *Static Electrical Discharge.*—The entire system of machinery which might have produced a static electrical discharge was well earthed.

Dust Explosions in Dust-collecting Systems.

The dangers of dust-collecting systems as sources of the initiation and propagation of dust explosions is well recognised.

Appended are certain extracts from the most authoritative and recent work on dust explosions.

General Conclusions.

The salient facts which have been brought to light in this investigation and which are of considerable importance from the point of view of industrial hygiene may be briefly stated as follows :—

1. The accumulation of a large amount of sugar dust in storage bins and dust-collecting system.
2. The probable use of an insufficiently guarded electric light in a cloud of combustible dust.
3. The use of iron tools for the purpose of scraping galvanised ironducts carrying a cloud of combustible dust.
4. The placing of an exhaust fan in a position where it could produce sparks by the passage of foreign material in the presence of a cloud of dust.
5. The danger of certain types of dust-collecting systems propagating explosions or fire.

EXPERIMENTS TO ASCERTAIN THE EFFECT OF BREAKING ELECTRIC LAMPS IN A CLOUD OF SUGAR DUST IN A CONCENTRATION OF ABOUT 200 GRAMMES PER CUBIC METRE.

Date—17th February, 1926. Temperature—Dry bulb, 91·5; Wet bulb, 71; R.H., 36 per cent.

Sugar Dust.—The sugar dust used was obtained from the ducts in the bins of the C.S.R. Two samples were used. The first sample contained ·28 per cent. moisture; the second ·20 per cent. moisture; The sugar was treated in a mortar for a few minutes, and passed through a coarse sieve. The circuit employed in the experiments and that at the Colonial Sugar Refining Company's Works were both 240 volts, direct current.

Lamp Used.	How Broken.	Result.	Remarks.
(1) Siemen's gas-filled 240 v. 75 w..........	By galvanised rod at top ...	Explosion.	
(2) ,, ,, ,, ...	,, ,, ...	,,	
(3) ,, ,, ,, ...	,, ,, ...	,, ...	Short circuit made.
(4) ,, ,, ,, ...	,, ,, ...	No explosion.	
(5) Royal Ediswan Metal (tungsten) vacuum, 240 v. 60 w.	,, ,, ...	,,	
(6) (7) (8) (9) ,, ,, ,, ...	,, ,, ...	,,	
(10) ,, ,, ,, ...	By galvanised rod blow at side of lamp.	Explosion.	
(11) Osram metal filament vacuum, 240 v. 55 w.	,, ,, ...	,,	
(12) ,, ,, ,, ...	,, ,, ...	,, ...	Short followed explosion at distinct interval.

EXPERIMENTS TO ASCERTAIN THE EFFECT OF BREAKING ELECTRIC LAMPS IN A CLOUD OF SUGAR DUST IN A CONCENTRATION OF ABOUT 200 GRAMMES PER CUBIC METRE—*continued.*

Date—18th February, 1926. Temperature—Dry bulb, 83; wet bulb, 69; R.H., 48 per cent.
Sugar dust used, moisture ·28 per cent.

Lamp Used.	How Broken.	Result.	Remarks.
(13) Siemen's gas-filled, 240 v. 75 w.	By glass rod blow at side ...	No explosion.	
(14) ,, ,, ,, ...	,, ,, ...	,,	
(15) ,, ,, ,, ...	By galvanised rod blow at top	Explosion ...	Short circuit made.
(16) ,, ,, ,, ...	,, ,, ...	,, ...	Globe saved for exhibition.
(17) Osram vacuum 240 v. 40 w.	By glass rod blow at side ...	,,	
(18) Phillips vacuum, metal filament, 240/25 BCP.	,, ,, ...	No explosion.	
(19) ,, ,, ,, ...	,, ,, ...	,,	
(20) Osram vacuum metal filament, 240 v. 40 w.	,, ,, ...	Explosion.	
(21) Ediswan vacuum metal filament, 240 v. 60 w.	,, ,, ...	,, ...	Temperature in box 85 deg. F. Experiment done within half minute of putting globe in box.
(22) ,, ,, ,, ...	By galvanised rod blow on top	No explosion.	,, ,,
(23) ,, ,, ,, ...	By glass rod blow at side	Explosion ...	Experiment made on steps in open air. Temp. D.B. 80 W.B. 67. Bulb kept for exhibition.

Of the bulbs broken in the presence of a cloud of sugar dust with a concentration round about 200 grammes per cubic metre, eight were of the gas-filled type. Of these *five produced an explosion* of the dust.

Fifteen electric lamps used were of the vacuum type. The details of the wattage of these lamps is given in the above tables. Of these *nine produced an explosion.*

Care was taken when fracturing these globes to prevent the instrument used forming a short circuit by touching the filament supports. In the case of the gas-filled lamps, the galvanised iron rod used to break the tops of the lamps was so arranged that it could not come in contact even with the metallic filaments, and the same precautions were taken with the vacuum lamps, with the exception of Nos. (10), (11), (12).

When the vacuum lamps were fractured by a blow on the side a glass rod was used, and this was so directed that though it might touch the metal filaments it could not deflect the filament supports.

A short circuit developed occasionally after an explosion; it could not be ascertained whether this was due to the falling on the terminals of fractured parts, or an aggregation of the products of combustion round the terminals.

All the experiments but No. (23) were made in a box 36 x 15 x 15 centimetres. The sugar was fed into this box by agitating a fine sieve. The lamp was placed in the bottom of the box, and means were provided for fracturing the globes. The cloud of dust produced was found by a series of tests to be round about 200 grammes per cubic metre.

From our observations at the C.S.R. mills, such a concentration of sugar dust was commonly produced by the method employed in cleaning out the ducts.

A similar cloud of dust was exploded in the open air by the fracturing of a vacuum lamp, experiment No. (23).

The statements of Price, Brown, Brown and Roethe, in "Dust Explosions, 1922," and of Gibbs in "Clouds and Smokes, 1924," are thus confirmed. It has been shown further that the statement by Price and his colleagues that both vacuum and gas-filled lamps will cause explosions, when broken in clouds of combustible dust, but that much depends on the manner in which the lamps are broken, is fully confirmed by our experiments with sugar dust.

By these experiments we are convinced that the breaking of a gas-filled or a vacuum lamp of a certain type in the ducts of a dust collecting system while a man was removing the sugar dust could, and most probably would, cause an explosion even in the absence of any short circuit, a thing which is liable to occur and which would intensify the risk.

DATA CONCERNING THE STORAGE BINS, GRADERS, AND DUST-EXTRACTION SYSTEM OF THE COLONIAL SUGAR REFINING COMPANY, PYRMONT.

Storage Bins and Graders.

No. of bins	10
No. of graders (on mezzanine floor above the bins)	10
Roof of bins (forming the main floor of the Grader-room)	12-inch concrete.
Manholes	2 feet diameter.
Inlet chutes from graders (galvanised iron)	4-inch diameter.

The main outside walls are brick and 14 inches thick.

The partition walls between the bins are 2 inches x 8 inches hardwood, bolted to timber uprights.

The bottoms are sloped and made of hardwood.

Horizontal tie rods for bracing cross the bins diagonally at various levels.

Illumination.—A dust-proof glass dome extends into each bin through the concrete roof, the light globes being fixed in the dome.

Dust extraction System.

Two main galvanised iron ducts which junction in No. 4 Bin extend through Bins 4, 5, and 6, being carried along opposite walls adjoining the remaining bins. At their point of junction they are 21 inches in diameter, and each tapers to 9 inches in diameter in Bin No. 6.

Branches (9 inches diameter) from the main ducts with slope junctions project into each bin. The mouth of each branch is covered with a cowl.

Inspection trap-doors in the main ducts are provided about every 12 feet, and it was through these openings that the cleaning out of the accumulations of sugar dust was done.

Multivane fan belt coupled to a totally enclosed D.C. motor. From the point of junction (in Bin No. 4) of the two main ducts a larger duct connects the entire system to the fan which is situated on the floor forming the roof of the bins. The evidence tendered at the inquest indicates that it is probable that the foreman was inspecting this large duct through a trap-door near the fan with an unprotected electric light globe attached to a lead, and the breaking of the globe caused the explosion.

The delivery side of the fan connects with a dust-extraction apparatus in an adjacent room on the same level.

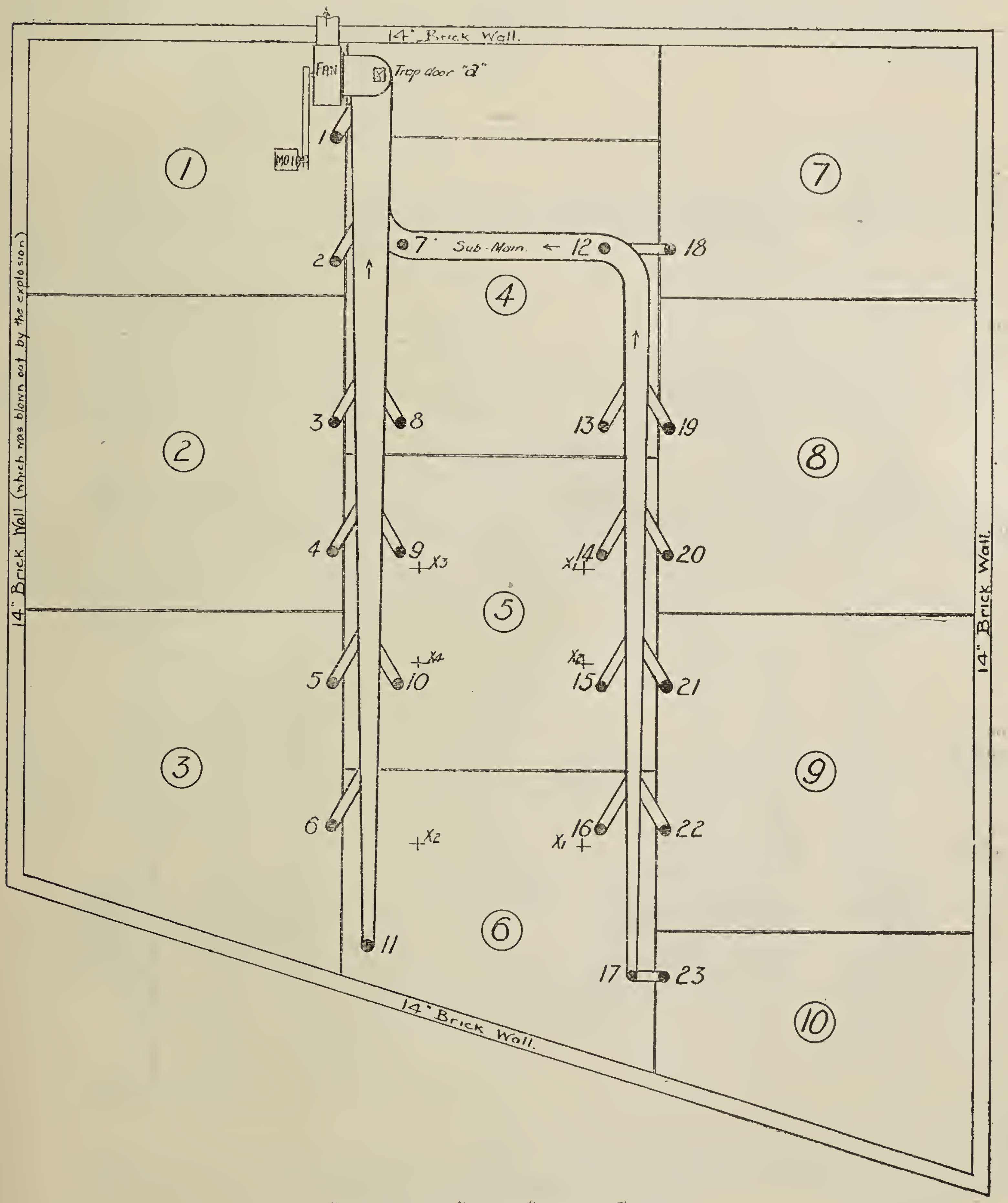

DIAGRAM OF SUGAR STORAGE BINS.

Showing—

Relative position of bins.

Main ducts of dust-extraction system and the branch ducts opening into the various bins.

Position of fan and motor on the floor of the grader room, which formed the roof of the bins.

It is probable that an electric light globe on a portable lead was lowered through an inspection trap-door at the point "*a*" near the fan.

Observations and Remarks on the Storage Bins after Explosion.

(*For reference numbers to bins, ducts, &c., see diagram.*)

Bin No. 1.

Exhaust intakes.—Sugar slightly burned on duct and walls round No. 1 and very burned on duct and walls round No. 2.

Remarks.—The effect of the burning extends mainly through the quarter of the bin near No. 2. Very little propagation seems to have come over the top of the partition wall from No. 4 Bin.

Bin No. 2.

Exhaust intakes.—Burning round both intakes, especially No. 3 (*i.e.*, intake adjacent to Bin No. 4).

Remarks.—No evidence of penetration through gaps in partition wall.

Bin No. 3.

Exhaust intakes.—Evidence of burning round both Nos. 5 and 6.

Remarks.—No evidence of penetration through gaps in partition wall. (The only evidence of this was in Bin No. 4.)

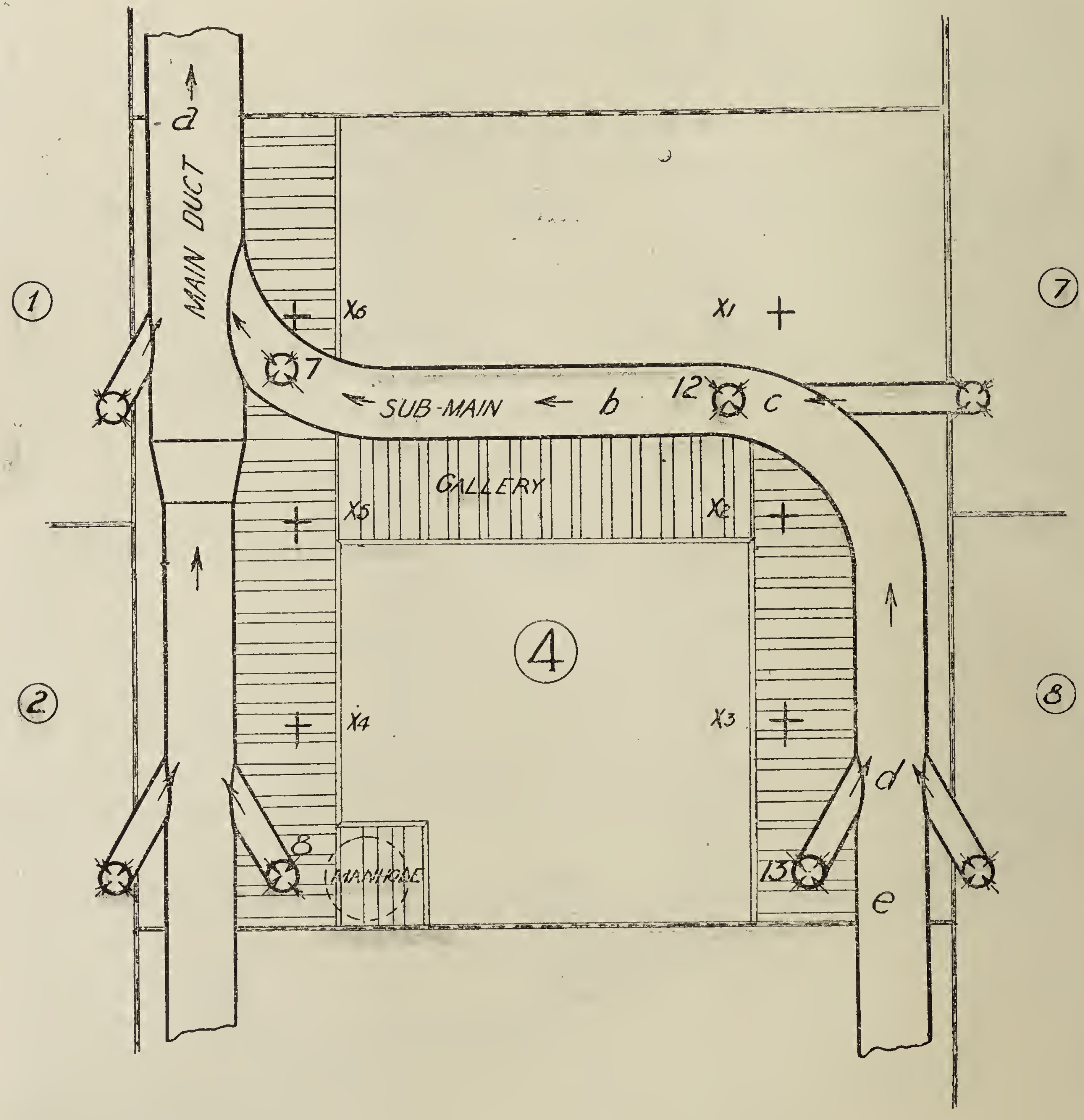

Diagram of Sugar Storage Bin No. 4.

Showing—

The chief ducts of the dust extraction system and the branch ducts going to other bins, the position of the chutes from the graders and the gallery which gave access to the various inspection trap-doors in the main ducts.

It is considered that a man was cleaning out the duct either at *b* or *d*. It is probable that the ignition of the dust was caused by the breaking of an electric light globe on a portable lead a a point in the main duct between the fan and the part labelled *a*.

Bin No. 4.

Exhaust ducts.—Burning of sugar was not marked in the duct at *a* (*i.e.*, the point nearest the fan).

Burning of sugar most marked at *d*, the point where the cleaning finished (about 9 feet from the partition wall into Bin No. 5). Burning of sugar also marked in branch duct at *d* leading into Bin No. 8, and was more marked in this branch than in Branch No. 13 opposite to it.

Burning of sugar was slight in branch duct leading to Bin No. 7.—N.B.—Burning of sugar was much less marked in the main duct than in the sub-main.

Exhaust intakes.—Marked burning of sugar on wall and top of main ducts round about intake No. 7.

Cowl missing from intake No. 8; roof spattered; burned sugar on walls and top of main duct.

Intake No. 12.—Markings on wall indicate that the burning was definitely caused by a blast of flame which had been deflected downwards by the cowl.

Intake No. 13.—Cowl not on (picked up some 12 feet away on the platform and did not show any signs of burning. It is assumed that the cowl was not in position at the time of the explosion). The roof was slightly marked and the whole of the sub-main duct along the partition wall joining Bin Nos. 7 and 8 was covered with burned sugar. The most marked burning of the sugar on the top of the ducts was seen at this section.

Chutes from graders :—

Chute X_1—Burned for distance of 3 feet.
X_2—No burning.
X_4—Burned for distance of 2 feet.
X_6—Burned for distance of 9 inches.
X_3 and X_5 not in use.

General.—No burning of sugar in bin.

Sugar on walls, tops of ducts, platform and railings, and all ledges and beams from about platform level to the roof showed signs of burning.

Cross beam about 8 feet below platform level was coated with burned sugar. (This mass of sugar was said to be still burning 15 minutes after the explosion.) This beam comes in the line of fire from exhaust No. 13 (the exhaust showing greatest burning).

Remarks.—Sub-main duct had been cleaned for a length of about 6 feet between *b* and *c*, and also portion *d–e* about 9 feet.

The remaining portions of the sub-main and all of the main duct in this bin were still coated with fine sugar to an average depth of about 4 inches.

There is a 6-inch space between the top of the partition walls and the roof. (This applies to walls joining Bins Nos. 1, 2, 7 and 8, *i.e.*, to the longitudinal and not the cross walls.)

Gaps exist in all the partition walls except those forming the outside brick wall of the bin system.

Bin No. 5.

Exhaust ducts.—All the ducts had been cleaned and showed signs of burning throughout. The main duct at intake No. 10 showed more signs of burning than the same duct showed in Bin No. 4.

Exhaust intakes.—Intake No. 9—Cowl missing; burned sugar was marked on roof, walls and top of duct at this point.

Burned sugar fairly marked at No. 15.

Chutes :—

Chute X_1—Burned for a distance of 2 feet.
X_3—Burned sugar throughout pipe, which was disjointed.
X_4—Burned for a distance of 9 inches.

General.—Burned sugar only found round duct openings.

No burned sugar on cross beams lower down.

The burning was more marked on the walls near intake No. 9 than at other points of the bin. (N.B.—There was no cowl on this intake—all the other cowls were intact.)

Bin No. 6.

Exhaust ducts.—Burning more marked in sub-main (*i.e.*, between intakes Nos. 16 and 17) than in the main duct. Burning both inside and on top of ducts.

Evidence of burning in main duct and branch arm extending into Bin No. 3. Very little burning of the sugar on the top of the main duct.

Chutes :—

Chute X_1—Burned for the entire length on inside, but was broken off at floor level, so that the flame may have come either way.
X_2—No burning.

Remarks.—No signs of any general combustion.

Bin No. 7.

Exhaust intake.—Intake No. 18—Duct blocked up with sugar dust; blocked up before explosion.

General.—Burning on roof and walls near intake No. 18, especially on the partition wall where intake No. 18 passes into Bin No. 4.

Signs of burned sugar in gaps of partition wall joining Bin No. 4.

The walls remote from intake No. 18 are clear and all the burning seems to be centred round this point.

No chutes were visible for inspection from the point of observation.

Remarks.—Flame seems to have blown through from Bin No. 4.

Bin No. 8.

Exhaust intakes.—Burning of sugar on walls near intakes Nos. 19 and 20.

The other three walls were practically free from burning.

Remarks.—The burning was most marked on the wall near intake No. 19 (the portion of the wall joining Bin No. 4).

Bin No. 9.

Exhaust intakes.—Burning marked round both intakes.

Remarks.—No flame appears to have come over partition wall from Bins Nos. 5 or 6, nor is there any evidence of propagation through the gaps in the wall.

The burning seems to be associated only with an outburst from the exhaust intake.

Bin No. 10.

Remarks.—There were only signs of burning near exhaust intake No. 23. The burning was confined to the half of the bin nearest No. 6 Bin.

Graders.

Number of graders ten.

All of the graders were probably working at the time of the explosion.

Since the explosion all graders except one have been cleaned of burned sugar.

EXTRACT FROM "DUST EXPLOSIONS."

Price, Brown, Brown and Rathe.

(Pp. 121–122).

Dust collecting systems are usually installed with the idea of being a protection as well as a means of cleanliness. However, they are known to have initiated and spread explosions. An explosion in a flour mill in Denver in January, 1918, is supposed to have started in the dust collecting system, possibly because of sparks struck by the blades of the fan against the sides of the casing. However, there was also evidence that this explosion started in the rolls and that it was drawn into the dust collecting system through which it propagated out into the plant. Two similar explosions are known to have occurred in flour mills, one at Benton, Pa., which started in the rolls and propagated through the dust collecting system, and the other at New Prague, Minn. In 1914–15 explosions in a starch and dextrine plant at Edgewater, N.J., were drawn into the dust collecting system. They propagated through it to the dust house, and from there to other portions of the mill, causing considerable damage. The explosion in the aluminium plant at Manitowbe started in the dust collecting system as a result of a piece of heavy wire getting into the fan where it struck sparks which ignited the aluminium dust. The explosion propagated back through the pipe and out into the room from which the dust was being drawn.

It is difficult to state just what was the cause of a number of explosions which have occurred in dust collectors. In some of these cases it might be that a flame or some smouldering material was drawn into the collector, or foreign material may have been pulled into the suction pipe creating sparks. It is possible that static electricity was developed within the collecting system. Such explosions occurred for instance in a cereal plant in Cedar Rapids, Iowa, on 11th January, 1902; in a cereal plant at Canal Fulton, Ohio, on 21st December, 1907; in flour mills at Nashville, Tenn., on 30th July, 1908; and in another mill at MacPherson, Kansas, on 8th March, 1911. Details regarding the installations in which these explosions occurred have not been obtained but indications are the dust was being collected from grinding machines or other equipment in which a quantity of dust was created. In a starch plant in Oswego, N.Y., on 28th September, 1907, an explosion occurred in the cyclone feed to the starch grinding room and extended to the dust collectors nearby causing an explosion which tore off the walls of the building and wrecked the cyclone and conveyor pipes. A similar explosion occurred in July of the same year but was not quite as extensive. While dust collectors have their advantages and tend to prevent explosions, care must be taken to see that they are operating effectively, that dust is not allowed to accumulate in the suction pipes and that they are so installed that should an explosion start and be drawn into the system there would be no possibility of its propagating into other sections of the plant.

. . . .

(P. 123).

Several instances have been given of explosions caused by sparks from foreign materials passing through grinding machines and by static electricity in various portions of plants. However sparks may be struck in other ways and may cause destructive explosions as they did for instance in a shoddy mill in Cleveland on 27th February, 1910, when an employee was cleaning out a vault into which dust was discharged from a cyclone collector. It is presumed that a spark was struck by a hoe which the employee was using. An explosion in the dust collecting system of a wood-working plant in Boston in 1918 was started by sparks from an emery wheel several feet from the suction pipe into which they were drawn. The explosions in elevators at Weehawken, N.J., in 1915, and at Baltimore in 1921, were supposed to have been caused by sparks struck by foreign material in the grain as it fell against the sides or bottom of a very deep bin. In both cases only a few hundred bushels of grain had been run into the bin at the time of the explosion.

. . . .

(P. 124)

The size of dust collecting apparatus has been increased to keep pace with our enlarged industrial plants, until now in many cases dangerous quantities of explosive dust are contained within the system, and the apparatus, designed to be a remedy, has become a hazard.

. . . .

(P. 74).

The possibility of fires or explosions from incandescent lamps in dusty atmospheres, such as are usually found in the handling of grain, starch, flour, sugar, and similar carbonaceous dusts may be classified under two distinct heads :—

1. Explosions caused by breakage of incandescent lamps in an atmosphere which has the proper proportions of dust and air to make it explosive.
2. Fires directly caused by ignition of dust collecting on lamp bulbs.

*Explosions from Broken Lamps.**

(P. 74.)

The first classification is by far the more important of the two considerations. It has already been shown that nearly all dusts having a high carbon content and being finely divided may be exploded by an open flame when such dusts are combined with air in the right proportion. It has also been shown that the electric arc or static electricity can start an explosion. These facts have been verified and, in addition, it has been shown that explosions under the same conditions may be obtained when an incandescent burner is broken or demolished in a dust cloud. Both vacuum and gas filled lamps will give the same result; the only exceptions noted so far have been very low wattage vacuum tungsten and carbon lamps. These lamps, however, are not excluded on this account because much depends on the character of the dust clouds and the manner in which the lamps are broken. If the cloud has the proper proportions of dust and air it is exploded when coming in contact with any lighted source such as a match, candle, lantern, or other flame.

. . . .

(P. 75.)

The breaking of incandescent lamp bulbs except by accident or careless usage is rare indeed. There are, however, certain practices in use in elevators which in view of the risk involved must be considered exceedingly dangerous. One of these is the lowering of an unprotected lamp bulb into an elevator bin to determine the amount of grain or feed it contains. The mechanical breakage of the bulb or a short circuit in the socket or wire, or the flash from a loose connection, may easily be sufficient to produce a disastrous explosion under the right conditions. This and other similar practices should be discontinued.

. . . .

REVIEW OF EXPLOSIONS CAUSED BY BREAKING OF ELECTRIC BULBS.

From Price, Brown, Brown and Rœthe.

Akron, Ohio.—An explosion occurred on 2nd December, 1913, in an elevator in Ohio. No lives were lost and damage to the property was small.

The explosion took place in an elevator leg used for transferring grain from one bin to another. The leg of the elevator on the first floor was blown off and the head was blown apart. After the explosion the odour present resembled that following the discharge of a shot gun. This was quite noticeable on the first floor and at the elevator head where the flames escaped. The officials thought that possibly a loaded cartridge had been thrown into the grain in shipment and due to the friction in handling it had exploded and ignited the dust.

At the time of the explosion one of the men was using an electric extension light to look into the leg from an opening on the first floor. Later it was found that the lamp had been burned out. It was not determined definitely what relation this had to the explosion, but it is possible that this may have been the cause.

Buffalo, N.Y.—An explosion of ground oat hulls occurred at a feed grinding plant at Buffalo, N.Y., 22nd November, 1921, when an electric lamp was broken within the head of an elevator carrying the ground material to the top floor of the mill.

A workman was using the light to inspect the elevator which had not been discharging properly. In some manner the steel buckets of the elevator struck the lamp which was protected by only a light wire guard. When this guard was crushed and the lamp broken the hot filament ignited the fine dust and the explosion occurred.

This case has been of unusual interest because it substantiates the theory that unprotected electric lights are a fire and explosion hazard in dusty industries. The workman referred to above was only slightly injured in this explosion and was able to tell accurately what occurred. On account of the clean condition of the plant no fire following the explosion and the property loss amounted to less than 4,000 dollars.

Argo, Ill.—Two workmen were seriously injured in an explosion in a starch factory 12th March, 1919, in Argo, Ill., believed to have been caused by the breaking of an electric light bulb which had been lowered into a starch bin. The property loss was not large.

Czegled, Hungary.—The only explosion which has occurred in Hungary in recent years took place in a flour mill when an electric bulb broke in a flour bin.

REPORT BY MR. C. W. R. POWELL, COLONIAL SUGAR REFINING CO.'S, SCIENTIFIC EXPERT ON THE SUGAR DUST EXPLOSION AT PYRMONT.

The report of Mr. Powell, the Company's expert, which was submitted to the Coroner, is given here as it is a useful criticism of our report.

It may be stated that Bloch has recently criticized the conclusions of Jaeckel and Beyersdorfer, and that our own practical work shows conclusively that Mr. Powell's hypothesis that the breaking of an electric globe in a cloud of sugar dust will not cause an explosion is incorrect.

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* The tests were conducted in co-operation with the National Lamp Works of the General Electric Co., Cleveland, Ohio; Edison Lamp Works of the General Electric Co., Harrison, N.J.; and Westinghouse Lamp Co., Bloomfield, N.J. The lamp testing work was carried on in the Nela Park laboratories of the National Lamp Works by C. L. Dows, assisted by H. G. Hills.

Mr. Powell says:—"There is no doubt that there was an ignition of a sugar dust cloud and that this resulted in a combustion of explosive violence which was propagated throughout the bins by means of the dust ducts.

Although there is no direct evidence on the point it seems probable that, as No. 4 Bin was the central point of the explosion waves, the explosion originated there.

An explosion does not necessarily originate at the seat of maximum intensity as was No. 4 Bin in this case, but it was found that when the direction of the explosion waves was plotted the lines indicating the direction all radiated from No. 4 Bin.

In No. 4 Bin itself the explosion waves radiated very markedly from the south-east corner and the conclusion is therefore reached that the explosion originated in that corner.

No. 4 Bin was the only one in which caramelisation was general throughout the bin.

Caramelisation was general throughout the dust collecting system with the exception of the 18 feet from the fan to a point just inside No. 4 Bin. Of this 18 feet of duct—

The fan showed no trace of fire.
3 feet from fan to handhole, ditto.
3 feet from handhole downwards, ditto.
Next 3 feet slightly smoked on one side.
Next 6 feet (horizontal) smoked on upper surface only.
Next 3 feet (horizontal) evidence of melted sugar on upper surface only.
Rest of duct (horizontal) evidence of caramelisation.

Possible Causes.—Causes often considered though frequently without any ground for doing so are:—

(1) Smoking or naked lights;
(2) Electric arc;
(3) Static electricity;
(4) Electric or other sparks;
(5) Breaking electric incandescent lamp.

(1) *Smoking or naked lights.*—Given the necessary conditions this is always a grave source of danger.

(2) *Electric arc.*—If an electric arc be produced by any means in a sugar dust cloud of the right concentration there is a possibility of explosion. In this case, however, the only electric lead that could have been used on the morning of the explosion was in good order.

(3) *Static electricity.*—This is an important source of danger. At Pyrmont, however, all points where dust was in motion were satisfactorily earthed so that it is difficult to understand how a charge could have accumulated.

(4) *Sparks.*—Jaeckel and Beyersdorfer have finally disposed of sparks as a possible cause of explosion in sugar refinery. From theory and experiment first working independently and then in collaboration with each other, they concluded that the ignition of sugar dust by sparks is impossible.

(5) *Breaking of electric globe.*—The only lamp to be considered had a thin filament which is immediately oxidised and broken on the admission of air. There is therefore only a momentary flash, so that the case is much similar to that dealt with by Jaeckel and Beyersdorfer above.

To check this, however, a calculation has been made which shows that the very small amount of heat energy liberated 2·92 calories, would be quite harmless in a dust cloud passing the source of heat at a speed of 30 feet per second.

By exhaustion therefore there remains no possible cause save No. 1, *i.e.*, smoking and naked lights, and in view of the evidence concerning No. 4 Bin already given, it is concluded that Johnson, who was supposed to have been engaged in the south-eastern corner of the bin, either struck a match to find a tool in the duct or was smoking.

Two suggestions, which are incorrect, have been made concerning the origin of the explosion:—

(1) That the necessary concentration of dust could be reached only in the duct.
(2) That the breaking of the lamp on a portable lead inserted at the handhole near the fan could have caused the explosion.

With regard to (1), a high local concentration could easily have been obtained in the bin by dislodging some of the accumulated dust. This could have been ignited by a naked flame (match or glowing cigarette), and an initial explosion produced which would have been sufficient to dislodge further accumulated dust and give an explosive mixture throughout the bin.

Without a naked flame, however, the conditions would have remained perfectly safe.

With regard to (2), apart from its impossibility, in view of the inadequacy of the source of heat, the suggestion is discredited by the condition of the duct throughout the section in which the lamp may have been hung.

There is no caramelisation at all up to a point 15 feet from the handhole, and what little melting and smoking occurs in portion of that distance has almost certainly been caused by a tongue of flame or smoke subsequently sucked through by the fan. Moreover, for 15 feet the bottom and sides of the duct were free of all trace of smoke, melted sugar, or caramel.

Had an explosion originated there of sufficient force to travel against the direction of the fan, caramel would certainly have been in evidence. (Caramel formed at 200 C., minimum ignition temperature of sugar dust is 410 C.)

It is also very improbable that the explosion would not have travelled in both directions and so have reached the fan."

SUMMARY.

This study deals with an investigation concerning a sugar dust explosion which caused three deaths. The circumstances attending the explosion have been extracted from the evidence given at the coroner's inquiry. It is concluded that the explosion was caused through the breaking of an unprotected electric light bulb by the foreman in the main duct of the dust extraction system. The foreman and two other men were engaged in cleaning out the accumulations of fine sugar dust from the ducts, an operation which was done every three months.

The various possible causes of such an explosion have been considered, and the breaking of an electric-light globe as the most probable cause has been substantiated.

Details of experiments which were carried out to ascertain the effect of breaking electric light bulbs in a cloud of sugar dust are given.

Diagrams and data concerning the storage bins, graders, and dust extraction system are presented, together with detailed notes of observations and remarks on the storage bins after the explosion.

An independent report on the cause of the explosion by the Sugar Company's scientific expert is also given.

Studies in Industrial Hygiene, No. 9.

Notes on the Degree of Comfort Produced by Admitting with the Plenum Air of a Theatre a Mixture of Ozone and an Essential Oil Vapour.

By C. F. ASSHETON, B.E., Engineer Assistant to the Medical Officer of Industrial Hygiene, Department of Public Health, New South Wales.

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Introduction.—At the request of Dr. Badham, Medical Officer of Industrial Hygiene, and acting on his advice, I have endeavoured to determine the degree of comfort produced by admitting with the ventilating air of a theatre a mixture of ozone and an essential oil.

An attempt has also been made to determine the quantity of ozone present in the theatre and its effect on the bacterial content of the air.

The inventor of an apparatus both for generating ozone and combining it with oil vapour, Mr. J. Jones, of Hobart, Tasmania, had one of his plants installed at the Crystal Palace Picture Theatre, George-street, Sydney, and it was at this theatre that the experiments were made.

A brief description of the principle of the ozonizer and oil vaporizer and a statement as to the possible results that might be expected with such an apparatus are given.

Bacterial and carbon dioxide estimations were made on several occasions in order to determine the effect of the ozone-oil mixture on bacteria and to show that, other conditions remaining the same there will be no reduction in the carbon dioxide content, which Mr. Jones states was found in another State.

The air movements were determined with a Kata thermometer and comfort votes using Vernon's scale were recorded.

A brief description of the lay-out of the theatre and its ventilating system, the seating capacity and positions where the various tests were made, are given.

The methods employed to detect the presence of the ozone are detailed, and the data collected has been presented in a tabulated form. The bacterial counts were carried out by Mr. Duffy, of the Microbiological Laboratory of this department.

Ozonizer.—The ozonizer employed is of the silent electrical discharge flat plate type, using glass as a dielectric, and is stated to yield something over 50 grm. of ozone per kilowatt hour, the plant installed at the Crystal Palace being rated at 1,000 watts.

Vaporizer.—The ozone is driven off from the ozonizer through a pipe by a fan and is passed into a chamber where it mixes with oil vapour. The oil gravitates from a reservoir and is fed into the chamber in drops at a rate of about 1 oz. per hour, the chamber being heated electrically to a temperature which will vaporize the globules of oil. The mixture of ozone and oil vapour is then directed into the air stream on the intake side of the ventilating fan and thus passed into the building with the plenum air. The oil employed during most of the tests was oil of thyme, although other essential oils were also experimented with and small quantities of perfume such as lavender, myrrh, &c., were added.

The resulting mixture is a cloudy fume, and as a fume similar in appearance is also obtained when ozone acts upon turpentine oil, it is probably caused by the action of the ozone upon the turpentine or other terpenes present in the thyme oil.

Oil of Thyme.—Oil of thyme contains from 25 to 45 per cent. thymol, a powerful germicide and deodorant, the remainder of the oil consisting of varying amounts of other unsaturated terpene derivatives, all of which probably take up ozone. For instance, turpentine oil takes up ozone completely and is able to absorb very large quantities of the gas, and white thyme oil, which was used by Mr. Jones during certain of the tests, is frequently adulterated with turpentine, the solubility of thymol in turpentine being 1 in 3.

Reasons for combining ozone and essential oil.—Mr. Jones has made use of the power of essential oils to take up large amounts of ozone (whether a chemical compound or a mechanical mixture results is not known), giving a substance which is free from the characteristic ozone smell.

The nose can detect two parts of ozone in one million parts of air. One part per million is commonly used in ventilation and three parts per million are rarely exceeded, although six parts per million are used. Five hundred parts per million, a proportion which could not be breathed, is said to destroy bacteria in air.

Ozone is chiefly used in ventilation on account of its power of destroying organic odours by oxidation and this method has been adopted because it permits of the use of greater concentrations than could normally be used with convenience.

Possible results that might be expected with this apparatus.—There are four claims advanced for the apparatus—

(1) The germicidal value of the ozone, especially with the concentration anticipated.
(2) The germicidal value of the thyme oil.
(3) The deodorizing value of the ozone.
(4) The deodorizing value of the thyme oil.

In dealing with these claims we have three things to consider:—

(1) The ozone.
(2) The thymol constituent of the thyme oil.
(3) The remaining constituents of the thyme oil.

It is this third group of substances which doubtlessly on account of their affinity for ozone permit the use of large concentrations of ozone, but unfortunately it is not known whether a mechanical combination takes place, and thus the turpentine, &c., are merely vehicles for the ozone or whether a chemical compound is formed so that the ozone is no longer available for further oxidation.

We thus have two assumptions:—

Assumption 1.—That each of the three constituents performs its own function separately. That is:—(1) the ozone acts as a deodorizer by oxidizing organic odours; (2) the thymol acts as a germicide and deodorant; and (3) the remainder of the thyme-oil acts as a vehicle for the ozone and as a germicide.

If this is the case then the thymol appears to be an excellent camouflage for the ozone because the characteristic smell of the latter is not noticeable in the theatre, but the fact that sore throats are not produced indicates that the ozone concentration is not excessive.

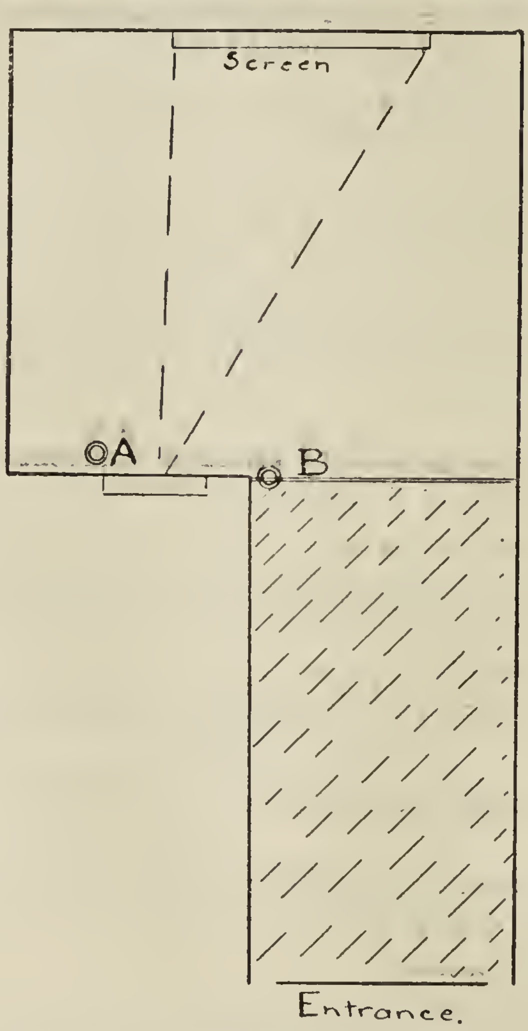
Assumption 2.—That the ozone forms a chemical compound with the remainder of the thyme-oil so that we have entering with the ventilating air—(1) thymol acting as a germicide and deodorant, and (2) a compound of ozone and turpentine, &c. Presumably this compound is incapable of deodorising by oxidation as it is itself a product of oxidation. Under these circumstances one might suppose that the organic odours are still present in the theatre but masked by the aroma of the thymol and new chemical compounds. If such is the case the use of thymol alone without ozone would be as effective.

Against this hypothesis it has been suggested that the ozone does form a chemical compound in the mixing box, but a secondary change takes place when the air is circulated through the theatre, and the ozone is again liberated. Mr. Jones states that some time after the ozone plant has been shut down one suddenly smells ozone, which he claims has been given up from the compound still in the air of the theatre. This assumption introduces a time function, namely, the interval between the formation of the compound and the secondary change when ozone is liberated, and its effectiveness will depend upon the rate of air change produced in the theatre. Presumably if the air change induced is not sufficient to sweep the air out of the theatre before the ozone is liberated, then one should smell ozone, unless, as stated in assumption 2, the odour of the gas is masked by the thymol; if on the other hand the air change is rapid enough to sweep the air out before the ozone is liberated, then the advisability of using ozone seems doubtful.

Bearing these features in mind various experiments were made in order to determine:—

(1) The degree of comfort produced by the system.
(2) The germicidal value of the installation.
(3) The ozone concentration in the theatre.

Particulars of Crystal Palace Theatre.—As shown in the sketch the theatre is L shaped. The stalls extend over the whole of the area and the dress circle over the hatched portion.



The plenum registers are distributed along the side walls, the fan, a 48 in. centrifugal, being housed in the basement of the theatre. There is no extraction system, but there is ample " get-away " for the air.

The seating capacity is approximately 1,000, the cubic contents 214,000 cubic feet, and the plant is capable of producing five changes of air per hour. Regulation of the degree of ventilation is obtained by dampering the intake of the fan.

The Kata readings, exposure of Petri's dishes and CO_2 estimations were made in the stalls at the point A and in the circle at the point B. It was considered that the position B on account of its unique situation was very representative of the theatre as a whole.

QUANTITATIVE OZONE ESTIMATIONS.

On the 20th October, 1926, an air sample was taken in a dried Winchester quart bottle by the aid of a bellows. Immediately afterwards 50 cc. of a 1 per cent. solution of potassium iodide was added, the bottle corked and thoroughly shaken. The analysis made the following day showed less ozone in the sample than in a blank sample which had been retained at the laboratory and similarly treated. The method of determination was considered unsatisfactory, it being evident that the ozone, if present, was certainly in very small quantities and would have to be estimated by passing a large amount of the air through potassium iodide or other solution. It is proposed to do this at some future date.

Particulars of plant, &c., on the 20th October, 1926 :—

Fan had been running since 11 a.m. at full capacity. Ozoniser was on for 20 minutes during the afternoon performance and started up again at 7·50 p.m.

Sample collected in stalls, 30 feet from nearest register from 8·35 to 9·0 p.m.

Temperature at 8·45 p.m. 71·5 D.B., 62·5 W.B., 60 per cent. R.H.

Remarks.—On entering the theatre (either stalls or circle) one noticed a distinct odour of thymol, &c., but the characteristic ozone smell was absent. This odour was most noticeable near the registers.

The day had been very hot (92·8 deg. F. and 26 per cent. R.H. at noon), followed by a cool evening.

The comfort was 4·0 in all parts of the house (see Comfort Scale at foot of Table 4).

QUALITATIVE TESTS TO DETERMINE THE PRESENCE OF OZONE.

The following qualitative tests were made, the results of which are presented in tabular form and show that the ozone was certainly leaving the mixing chamber with the oil although its presence could only just be indicated 18 in. away from it. This may have been due to dilution. There was no indication of the presence of ozone in the plenum air stream 20 feet from the fan; nor at the registers, nor in the theatre.

I am indebted to Mr. O'Brien, of the Government Analyst's Branch, for suggesting and preparing the following papers and solutions which were employed :—

(1) Litmus K.I. paper.
(2) K.I. starch paper.
(3) K.I. phenolphthalein.

Prepared papers moistened in water and solutions for use with plain papers were employed.

TABLE 1.—Qualitative Tests for Ozone at Crystal Palace Picture Theatre, 27th October, 1926.

Test No.	Nature of Test.	Time p.m.	Position.	Result.	Remarks.
	Ozonizer not Running.				*Ozonizer not Running.*
1	Litmus K.I. Paper	8·15	Stalls at A	Nil	Exposed for 10 min. Temp. 71; 58; 45 per cent.
2	K.I. Starch Paper	8·15	Stalls at A.....................................	,, ...	Exposed for 10 min. Temp. 71; 58; 45 per cent.
3	K.I. Phenolphthalein	8·35	Circle at B	,, ...	Exposed for 10 min. Temp. 74; 60; 43 per cent.
	Ozonizer Running.				*Ozonizer Running* (started at 8·45 p.m.)
4	K.I. Starch Paper	8·45	Mouth of delivery tube from apparatus.	Present	Dark blue reaction; ozone only.
5	K.I. Phenolphthalein	8·45	,, ,, ,, ...	,, ...	Faint pink reaction; ozone only.
6	K.I. Starch Paper	8·47	,, ,, ,, ...	,, ...	Faint blue; ozone and oil.
7	Litmus K.I. Paper............	8·51	,, ,, ,, ...	,, ...	Dark blue; ozone and oil.
8	K.I. Starch Paper	8·51	,, ,, ,, ...	,, ...	Dark blue; ozone and oil.
9	Litmus K.I. Paper	8·57	,, ,, ,, ...	,, ...	Faint blue; ozone and oil.
10	K.I. Phenolphthalein	8·57	,, ,, ,, ...	,, ...	Very faint pink; ozone and oil.
11	K.I. Starch Paper	9·0	In duct 20 feet from fan............	Nil	Exposed for 2 min.; ozone and oil.
	K.I. Starch Paper	9·3	Mouth of delivery tube	Present	Dark blue; ozone and oil.
12	Litmus K.I. Paper	9·5	In duct 20 feet from fan............	Nil	
	Litmus K.I. Paper	9·8	Mouth of delivery tube	Present	Faint blue; ozone and oil.
13	K.I. Starch Paper	9·5	In duct 20 feet from fan............	Nil	
	K.I. Starch Paper	9 8	Mouth of delivery tube	Present	Dark blue; ozone and oil.
14	K.I. Starch Paper	9·12	In duct 20 feet from fan............	Nil	Ozone only.
	K.I. Starch Paper	9·14	Mouth of delivery tube	Present	Dark blue; ozone only.
15	K.I. Phenolphthalein	9·16	In duct 20 feet from fan............	Nil	Dark blue; ozone only.
	K.I. Phenolphthalein	9·19	Mouth of delivery tube	Present	Faint pink; ozone only.
16	K.I. Starch Paper	9·16	In duct 20 feet from fan............	Nil	Ozone only.
	K.I. Starch Paper	9·19	Mouth of delivery tube	Present	Dark blue; ozone only.
17	K.I. Phenolphthalein	9·26	,, ,, ,, ...	,, ...	Faint pink; ozone and oil.
18	K.I. Starch Paper	9·26	,, ,, ,, ...	,, ...	Dark blue; ozone and oil.
19	K.I. Starch Paper	9·30	16 inches from delivery tube......	,, ...	*Very faint blue;* ozone and oil.
	K.I. Starch Paper	9·30	Mouth of delivery tube	,, ...	Dark blue; ozone and oil.
20	K.I. Starch Paper	9·47	Stalls at A.....................................	Nil	Temp. 70·5; 58; 46 per cent.; ozone and oil.
21	K.I. Starch Paper	9·30–10·25	In duct 20 feet from fan............	,, ...	Papers were suspended in the duct.
22	K.I. Phenolphthalein	9·30–10·25	,, ,, ,, ...	,, ...	Papers were suspended in the duct.

These tests do not permit one to estimate the concentration existing, although the following calculation indicates that it was probably two parts in three million, an amount which would hardly be traced by such indicators, and which, furthermore, is the usual concentration used with ozone alone for ventilating purposes.

Computed Ozone Concentration.—

Average yield of most ozonizers (according to Mr. Jones, his plant is probably more efficient than this)—50 grm. per KW. hour.

Power consumed by Jones ozonizer—1,000 watts.

Therefore yield—50 grm. per hour or $\frac{50}{60}$ grm. per min.

Plenum air entering theatre at rate of (from anemometer reading)—18,200 cub. ft. per min. or 515 cub. metres per min.

Concentration equals $\frac{50}{60}$ grm. per 515 cub. metres or 1·62 mgm. per cub. metre.

But 24 grm. of ozone equals 22,400 c.c.

Therefore 1·62 mgm. equals $\frac{22{,}400}{24{,}000} \times 1{\cdot}62$ c.c. or 1·51 c.c.

Hence the concentration is 1·51 parts per million of air.

From 1 to 3 parts per million is a common concentration used abroad for ventilating purposes.

TABLE 2.

Tabulated statement of tests made to determine the effect of an Ozone-oil mixture on the bacterial content of the air of the Crystal Palace Theatre.

Date.	Petri's Dish No.	Where exposed.	Exposure interval. p.m.	Colonies.			Temperature in Deg. F.			Remarks.
				Total.	Computed for 10 min. exposure.	Remarks	D.B. deg.	W.B. deg.	R.H. per cent.	
20-10-26		*Ozonizer running*—					63·0	57 0	69	Outside at 8·0 p.m.
	1	On floor at A......	8·30–35	326	652	Mostly chromogenic types (yellow) yeasts, sporing bacilli, and negative bacilli probably coliform.	71·5	62·5	60	Attendance—Stalls, 90%,
	2	,, ...	8·30–40	684	684		71·5	62·5	60	Circle, 95%.
	3	,, ...	8·30–45	600	400		71·5	62·5	60	Very comfortable.
	4	4 feet above floor at A.	8·30–35	720	1,440		71·5	62·5	60	Smell of thymol in theatre.
	5	,, ...	8·30–40	464	464		71·5	62·5	60	
	6	,, ...	8·30–45	736	490		71·5	62·5	60	

TABLE 2—*continued.*

Date.	Petri's Dish No.	Where Exposed.	Exposure Interval. p.m.	Colonies. Total.	Colonies. Computed for 10 min. exposure.	Colonies. Remarks.	Temperature in Deg. F. D.B. deg.	Temperature in Deg. F. W.B. deg.	R.H. per cent.	Remarks.
21-10-26		*Ozonizer not running since previous day*—					64·0	58·0	70	Outside at 8·0 p.m.
	7	On floor at A	8·30–35	19	38	Chromogenic (yellow), also some albus-like colonies.	72·0	63·0	61	Attendance—Stalls, 80%, Circle, 90%.
	8	,, ...	8·30–40	64	64		72·0	63·0	61	
	9	,, ...	8·30–45	47	31		72·0	63·0	61	No smell of thymol in theatre.
	10	4 feet above floor at A.	8·30–35	21	42		72·0	63·0	61	
	11		8·30–40	35	35		72·0	63·0	61	Very comfortable.
	12	,, ...	8·30–45	45	30		72·0	63·0	61	
27 10-26		*Ozonizer not running* (had not been running during the day)—					68·0	53·0	34	Outside at 7·50 p.m.
	13	Stalls at A	8·8–18	23	23	Mostly chromogenic (yellow), sporing and albus-like colonies.	71·0	58·0	45	Attendance—Stalls, 60%, Circle, 90%.
	14	,, ...	8·8–18	40	40		71·0	58·0	45	
	15	Circle at B	8·25–35	25	25		74·0	60·0	43	Very comfortable.
	16	,, ...	8·25–35	21	21		74·0	60·0	43	
	–	*Ozonizer running*—								
	17	Stalls at A	9·47–57	29	29	,, ,, ...	70·5	58·0	46	Plant started up at 8·45.
	18	,, ...	9·47–57	20	20	,, ,, ...	70·5	58·0	46	
	19	Circle at B	10·4–14	15	15	,, ,, ...	72·0	59·0	45	
	20	,, ...	10·4–14	5	5	,, ,, ...	72·0	59·0	45	
	21	Stalls at A	10·18–22	20	50	,, ,, ...	70·0	58·0	48	N.B.—Programme ended at 10·21 p.m. and people commenced to leave the theatre. Hence the high bacterial count.
	22	,, ...	10·18–22	54	135	,, ,, ...	70·0	58·0	48	
3-11-26		*Ozonizer not running* (had not been running during the day)—								
	23	Circle at B	8·25–35	31	31	Mostly moulds, chromogenic (yellow and white).	73	61	50	Ceiling fans not running, roof not open.
	24	,, ...	8·25–35	24	24		73	61	50	
	25	,, ...	8·50–9·0	24	24		74	61	47	Attendance, 85%.
	26	,, ...	8·50–9·0	21	21		74	61	47	
		Ozonizer running—								
	27	Circle at B	9·30–40	16	16	,, ,, ...	74	60	43	Cool day with a shower at mid-day.
	28	,, ...	9·30–40	11	11	,, ,, ...	74	60	43	
	29	,, ...	9·50–10·0	9	9	,, ,, ...	74	60	43	
	30	,, ...	9·50–10·0	8	8	,, ,, ...	74	60	43	
	31	,, ...	10·10–20	5	5	,, ,, ...	74	60	43	
	32	,, ...	10·10–20	8	8	,, ,, ...	74	60	43	
11-11-26		*Ozonizer not running*—(had been on for half-an-hour from 2 to 2·30)—					64	58·5	72	Outside at 8 p.m.
	33	Circle at B	8·40–50	22	22	1 mould, others chromogenic.	74	64	58	Attendance—Stalls, 75%, Circle, 95%.
		Ozonizer running—								
	34	Circle at B	9·15–25	14	14	All chromogenic	74	64	58	Ozonizer started at 8·55 p.m.
	35	,, ,, ...	9·43–53	20	20	Two moulds, others chromogenic.	74	64	58	Ceiling fans running, roof closed over, very comfortable.
	36	,, ,, ...	9·43–53	Experimental plate seeded on surface with culture of B. coli, was exposed under the same conditions as plate No. 35—showed abundant growth after overnight incubation.			74	64	58	
17-11-26		*Ozonizer not running*—(had been on from 2 to 2·30 during the day)—					60	48	39	Outside at 7·40 p.m. v. cold.
	37	Circle at B	7·42–8·0	169	94	Chromogenic and moulds.	72	55	31	Theatre gradually filling.
	38	,, ,, ...	7·42–8·0	105	58		72	55	31	Dress circle and stalls full at 8 p.m.
	39	,, ,, ...	8·20–40	109	54	,, ,, ...	75	59	37	Very comfortable.
	40	,, ,, ...	8·30–48	100	56	,, ,, ...	75	59	37	
		Ozonizer running—								Ozonizer started at 8·48 p.m.
	41	Circle at B	8·52–9·12	125	62	,, ,, ...	79	59	24	Distinct smell of ozone, &c., Roof closed, ceiling fans not running.
	42	,, ,, ...	9·12–32	62	31	,, ,, ...	75	59	37	Very comfortable.
	43	,, ,, ...	9·12–32	83	41	,, ,, ...	75	59	37	
	44	,, ,, ...	9·30–50	52	26	,, ,, ...	75	58	34	
	45	,, ,, ...	9·30–50	55	27	,, ,, ...	75	58	34	

REMARKS.—At the position B in the circle the dishes were exposed 4 feet above the floor, the nearest register being 20 feet away.

Conclusions from Table 2.—On the 20th October, 1926, the plant was running during the entire performance and was not started up again until several days later, so that the test made on the 21st October, 1926, represented normal conditions. The plates were exposed at similar times under practically the same conditions of temperature and attendance, although the first day had been hot and the second pleasant. These results show a marked increase in the bacterial content when the plant was operating, and therefore are of no assistance except that they indicate that, other factors remaining the same, the bacterial content is constant for a particular evening.

The test on the 27th October, 1926, shows a reduction in Nos. 19 and 20, $1\frac{1}{4}$ hours after the ozone-oil mixture was admitted. Readings 21 and 22 amply illustrate the variation caused by people moving about the theatre.

The test on the 3rd November, 1926, shows a graduated reduction in the bacterial content, and similarly those made on the 17th November, 1926.

On the 11th November, 1926, a plate inoculated with B. coli was exposed at the same time as No. 35, but the growth of the bacteria was not inhibited.

On the whole these tests indicate the possibility of the ozone-oil mixture reducing the bacterial content of the air of the theatre, but as there are so many factors which will affect the number of bacteria deposited on a Petri's dish it would be necessary to carry out many more experiments before conclusive results could be obtained.

TABLE 3.

Tabulated statement of results of carbon dioxide estimations with a portable Haldane apparatus at the Crystal Palace Theatre.

Date.	Sample No.	Time p.m.	Where collected.	Temperature in in Deg. F.			Carbon di-oxides in parts per 10,000.	Remarks.
				D.B. deg.	W.B. deg.	R.H. per cent.		
			Ozonizer not running—					
3-11-26	1	8·15	Air in duct 20 feet from fan on delivery side.	72	58	42	5	No ozone used during the day. Fan running at full capacity.
	2	8·18	,, ,, ,, ...	72	58	42	4	
	3	8·25	Circle at B	73	61	50	9	Attendance, 85%. Ceiling fans not running; roof not open.
	4	8·30	,, ...	73	61	50	7	Warm and close.
	5	8·40	Back of circle	...	...	...	9	
	6	8·50	Circle at B	74	61	47	7	
			Ozonizer running—					
	7	9·25	Air in duct 20 feet from fan on delivery side.	...	...	...	4	Ozonizer running.
	8	9·40	Circle at B........	74	60	43	6	
	9	9·45	Back of circle........	...	...	...	9	
	10	9·50	Circle at B........	...	...	...	12	
			Ozonizer not running—					
11-11-26	11	8·0	Air in duct 20 feet from fan on delivery side.	70	61	59	3	Ozonizer not running.
	12	8·35	Back of circle........	74	64	58	8	Attendance, 95%.
	13	8·40	Circle at B	74	64	58	8	Roof closed, ceiling fans working.
	14	8·43	Back of circle........	74	64	58	8	
			Ozonizer running—					
	15	8·55	Air in duct 20 feet from fan on delivery side.	...	...	...	4	Comfortable.
	16	8·55	,, ,, ,, ...	...	...	...	4	
	17	9·15	Circle at B	...	...	...	13	
	18	9·30	,, ...	...	...	...	9	Interval 9·25–35.
	19	9·43	,, ...	...	...	...	7	
	20	9·53	,, ...	...	...	...	8	
	21	9·58	,, ...	74	64	58	7	

Conclusions from Table 2.—As was anticipated, these results show that, other conditions remaining the same the carbon dioxide content of the air of the theatre will remain constant or increase if the ventilation is below that necessary to keep it from rising, the ozone-oil mixture having no effect upon it.

TABLE 4.

Tabulated statement of Kata thermometer readings, air movements, comfort votes, temperatures and general remarks concerning the conditions on certain evenings when tests were carried out at the Crystal Palace Theatre to determine the effect of an ozone-oil mixture admitted with the plenum air.

Place.	Time.	Cooling Powers.		Temperatures, Deg. F.			Air Movement ft./min.	Comfort votes.	Remarks.
		Dry Kata.	Wet Kata.	D.B. deg.	W.B. deg.	R.H. per cent.			
20-10-26—									
Outside	8·0	12·1	30·2	63·0	57·0	69	214	......	Cool, dry, fair breeze.
Stalls	8·20	5·0	16·2	72·0	63·0	61·0	28	3·5	Ozonizer running. Attendance, 90%.
Circle	9·0	5·2	14·1	73·0	63·0	57	40	3·5	,, ,, 95%.
Outside	10·0	...	...	62·5	56·0	66·5	...	......	
21-10-26—									
Outside	8·0	10·3	...	64·0	58·0	70	149	......	Cool breeze—had been a pleasant day.
Stalls	8·15	6·2	...	72·0	63·0	61·0	67	4·0	Ozonizer not running. Attendance, 80%.
Circle	8·35	4·1	...	74·0	64·0	58	16	3·0	Ozonizer not running. Attendance, 90%. roof closed over, ceiling fans not running.
Circle	9·0	4·8	...	74·0	64·0	58	33	3·5	Roof opened, ceiling fans running.
27-10-26—									
Outside	7·50	14·2	36·2	68·0	53·0	34	410	......	
Stalls	8·10	5·6	18·7	70·0	57·0	44	32	4·0	Ozonizer not running, Attendance, 60%.
Circle	8·30	4·6	14·6	74·0	60·0	43	28	3·5	,, ,, 90%.
Stalls	8·55	5·0	16·1	70·0	58·0	48	19	4·0	Ozonizer running, started up at 8·45.
Circle	9·40	4·2	13·3	73·0	59·0	42	14	3·5	,,
11-11-26—									
Outside	8·0	9·6	19·7	64·0	58·5	72	119	......	
Stalls	8·15	5·1	9·4	72·0	63·0	61	30	4·0	Ozonizer not running. Attendance 75%.
Circle	8·40	4·4	9·1	74·0	64·0	58	22	3·0	,, ,, 95%
Stalls	8·55	5·1	10·1	71·5	63·0	62·5	28	4·0	Ozonizer running, started up at 8·55.
Circle	9·30	4·2	8·9	74·0	64·0	58	18	3·0	,,

NOTE.—The comfort votes recorded are means of the votes of three observers, using Vernon's Scale of Comfort as follows:—Very stagnant, 0; Very stagnant to stagnant, 1; stagnant, 2; stagnant to medium, 3; medium, 4; fresh, 6; very fresh, 8.

Conclusions from Table 3.—These readings are of no particular significance as the conditions of comfort on the evenings of the tests were practically the same whether the ozone-oil mixture was used or not.

In order to obtain conclusive results with this method of testing it would be necessary to be able to compare these result with those obtained during a hot evening such as is frequently experienced in the month of February.

CONCLUSIONS.

The following conclusions on the comfort produced by admitting with the plenum air of a theatre a mixture of ozone and an essential oil vapour are drawn from experiments, personal experience and the opinions of colleagues and members of the audience :—

(1) There is a distinct absence of the usual body odours, &c., met with in crowded buildings.

(2) From inquiry there seems to be general consensus of opinion that this absence of body odours both on hot nights when the fan has been full on and on cooler nights when the air supply is less has produced a greater degree of comfort in the theatre.

(3) There is a distinct smell of thymol, but the concentration is not strong enough to be objectionable. In fact, from my own experience and the result of my inquiries, I should say that it was more or less pleasant and certainly never oppressive. One notices the smell distinctly on entering the theatre, but gradually becomes accustomed to it.

(4) The experiments indicate a possible reduction in the bacterial content of the air due to the ozone-oil mixture, although more work will have to be done both to determine this and the actual ozone content of the air.

(5) There have been no complaints of sore throats.

(6) With the three factors, dry and wet bulb temperature and air movement, which affect physical comfort, there may be a fourth one due to odours which, although perhaps harmless in themselves, do produce a sense of discomfort.

(7) The distinct absence of these unpleasant odours with this plant in operation is, to my mind, a primary argument in favour of such an installation.

(8) The method is worthy of a more detailed investigation.

SECTION II.

1926.

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I.—Metropolitan Combined Sanitary Districts of Sydney.

Report of the Medical Officer of Health for the Year 1925.

J. S. Purdy, D.S.O., M.D., C.M.(Aberd.), D.P.H.(Camb.), F.R.S.(Edin.), F.R.San.I.

To the Director-General of Public Health.

Sir,

I have the honour to report on the health conditions of the Combined Sanitary Districts of the Metropolitan Area of Sydney for the year 1925. Three statistical facts show that with a remarkable increase of population the general and infantile mortality rates remain low.

On the 31st December, 1925, the population of the Metropolitan Combined Sanitary Districts was 1,184,480, an increase during the year of 33,610, equivalent to 2·92 per cent.; the death rate was 9·3 per 1,000 of the population, 4 per cent. below the average of the previous five years; and the infantile mortality was 55·6 per 1,000 births, the lowest rate recorded for this area, actually 10 per cent. below the average of the previous five years.

Summary of Vital Statistics for 1925.

Metropolitan Combined Sanitary Area, 442,981 acres (692$\frac{1}{6}$ square miles).
Population (estimated to the middle of the year), 1,165,850.
Births, 25,101 (birth rate, 21·53).
Deaths, 11,555 (death rate, 9·3).
Deaths of infants under 1 year of age, 1,395 (infantile mortality rate, 55·6 per 1,000 births).
Births in hospitals and institutions, 10,964 (44 per cent. of whole).
Deaths in hospitals and institutions, 6,135 (53 per cent. of total).

Population.

Population.—The Metropolitan Combined Sanitary Districts for purposes of Health administration consist of the "Metropolis" and "Extra Metropolitan District."

The Metropolis proper, or "Sydney and Suburbs," includes the city of Sydney, forty municipalities, and Kuring-gai Shire.

The "Extra Metropolitan District" is separately dealt with statistically, and includes twelve municipalities and two shires.

The population of the Metropolitan Combined Sanitary Districts at the end of 1925 was 1,184,480, the increase during the year being 33,610, equivalent to 2·92 per cent. The mean population was 1,165,850. The estimated population for 1950 at an annual rate of increase equivalent to that of last year would be 2,535,200. Calculated on the last decennial increase of population it would be 2,855,532, calculated (with logarithms) by geometrical progression on the known population for 1915 and 1925.

Metropolis proper (Sydney and Suburbs).—The population was estimated by the Government Statistician to be 1,039,390 on 31st December, 1925, of which the City of Sydney contained 106,350, a decrease of 2,730, and the suburbs 933,040, an increase of 30,150 for the year. The annual rates of increase between the last four Census were 2·33 per cent. from 1891 to 1901, 2·69 from 1901–1911, and 3·60 from 1911 to 1921. The annual rate for twenty years up to 1921 was 3·15 per cent. The mean population was 1,024,240. The instances in which population figures as estimated by the Government Statistician have been altered in this report are in the case of the municipalities of Lidcombe, Hunter's Hill, and Leichhardt, in the two latter of which there are large mental hospitals—Gladesville, 1,269 average daily number; Callan Park, 1,223. As in previous reports, deaths among the inmates of these hospitals have been distributed to the districts in which they had previously resided. Consequently, whilst including the inmates in the total population for the Metropolis, it was necessary to exclude the inmates of these hospitals from the estimate of the population of the municipalities in which they are situated.

"Extra Metropolitan District."—The estimated population was 145,090 on the 31st December, 1925, an increase of 6,290 (110 and 2,000 less increase than in the previous two years respectively). Mean population exclusive of benevolent homes and mental hospitals, 135,090.

Births.

Metropolis.—The Government Statistician's report shows that the number of births registered in the Metropolis proper during the year 1925 was 22,036, equivalent to a birth rate of 21·51 per 1,000 of population. Of the total, 11,196 were males and 10,840 females, the proportion being 103 males to 100 females. The number of births was 22 below that of the previous year. The rate was 8·8 per cent. below the average of the preceding five years. The birth rate for 1925 was next to that of 1919 (22·08), the lowest recorded for the Metropolis. This was less even than that of 1903, after which there was an increase to 1912, and then a gradual decline to 1914, since then to the end of 1919 the decline was at the rate of 5 per 1,000. For the first three years of the second decade of the present century there was a rise in the birth rate. The subsequent decline was for the most part attributed to the war, and the marked rise in the first two years of the third decade to the return of the soldiers. As a general rule the birth rate declines as the standard of comfort, convenience and earning power of the community increases.

The number of illegitimate children born during the year was 1,531, or 6·95 per cent. of the total births, equivalent to 1·49 per 1,000 of the population, which rate is 5·1 per cent. below the average of the previous five years. Of these children 76 per cent. were born in public institutions.

"*Extra Metropolitan District.*"—There were 3,065 births registered during the year, equivalent to 22·69 per 1,000 of the population, being 6 per cent. below the quinquennial average. Included in the total were 101 illegitimate births, or 3·3 per cent. of the total, equivalent to 0·75 per 1,000 of the population.

TABLE 1.

SHOWING Population, Density of Population, and certain Death-rates in the Municipalities of the Metropolitan Combined Sanitary Districts for 1925, including deaths which have occurred in General Hospitals, Special Hospitals for Consumption, and Hospitals for the Insane. Deaths occurring in Hospitals in the Metropolis have been distributed to their proper districts before calculating these rates.

Municipality.	Estimated Mean Population.	Density of Population to the acre.	Death Rate per 1,000 of Population.				
			All Causes.	Diarrhœal Diseases, including Enteritis.	Epidemic Diseases.	Tuberculosis of Respiratory System.	All Tubercular Diseases.
City of Sydney	107,920	33·3	13·03	·16	·32	1·12	1·17
Alexandria	10,030	9·5	9·57	·89	·89	·29	·29
Annandale	12,790	37·0	9·46	·23	·15	·93	·93
Ashfield	37,260	18·2	9·63	·34	·23	·37	·42
Balmain	32,470	33·2	11·11	·55	·37	·24	·30
Bexley	17,130	9·0	6·88	·40	·00	·29	·29
Botany	6,720	3·1	9·36	·74	1·18	·29	·29
Burwood	17,710	16·0	9·82	·22	·11	·50	·62
Canterbury	53,250	6·4	6·04	·24	·33	·33	·44
Concord	16,980	6·2	6·41	·23	·11	·29	·41
Darlington	3,650	67·6	7·94	·00	·27	·82	·82
Drummoyne	23,520	12·0	7·48	·29	·25	·21	·21
Eastwood	2,530	0·9	12·64	·39	·39	·39	·39
Enfield	11,180	6·7	8·49	·26	·35	·18	·18
Erskineville	7,560	40·6	9·26	1·33	·66	·13	·13
Glebe	22,930	44·3	9·72	·34	·43	·61	·74
Homebush	2,550	4·3	14·90	·39	·78	·39	·39
Hunter's Hill	8,650	6·1	9·01	·00	·69	·11	·22
Hurstville	16,900	2·7	9·41	·29	·41	·35	·53
Kogarah	22,880	4·8	8·75	·17	·35	·52	·56
Lane Cove	12,330	4·8	5·83	·08	·48	·24	·32
Leichhardt	30,180	26·1	8·98	·29	·19	·39	·62
Manly	23,040	8·2	8·42	·39	·30	·30	·34
Marrickville	44,660	23·6	8·73	·18	·40	·35	·49
Mascot	11,790	5·3	7·63	·16	·33	·08	·08
Mosman	22,610	10·6	8·67	·13	·44	·22	·22
Newtown	28,360	59·1	10·01	·24	·42	·67	·77
North Sydney	51,810	20·5	8·31	·25	·28	·38	·42
Paddington	26,640	63·3	13·37	·41	·33	·60	·71
Petersham	27,090	31·9	9·22	·33	·22	·45	·51
Randwick	62,360	7·3	7·64	·09	·16	·37	·45
Redfern	24,070	59·6	10·63	·49	·58	·49	·49
Rockdale	30,470	6·0	7·81	·29	·36	·26	·36
Ryde	19,640	2·8	9·42	·25	·50	·45	·45
St. Peters	13,200	14·6	8·71	·60	·38	·68	·68
Strathfield	10,350	5·8	8·68	·19	·00	·29	·29
Vaucluse	5,360	6·7	6·71	·19	·00	·00	·00
Waterloo	11,600	14·0	11·11	·34	·17	·86	1·03
Waverley	44,690	2·0	8·50	·13	·22	·31	.40
Willoughby	36,380	6·7	7·49	·30	·32	·49	·52
Woollahra	29,940	15·9	8·0	·13	·40	·30	·30
Ku-ring-gai Shire	23,050	1·1	8·37	·13	·21	·69	·78
Total Metropolis	1,024,240	8·7	9·15	·26	·32	·47	·53
			Extra Metropolitan Municipalities.				
Auburn	16,390	6·3	8·1	·36	·00	·54	·67
Bankstown	15,120	·8	5·6	·13	·00	·52	·52
Cabramatta and Canley Vale	3,820	·5	5·2	·00	·00	·26	·26
Dundas	4,610	1·7	2·6	·00	·21	·00	·00
Ermington and Rydalmere	1,990	1·0	62·8	2·00	1·50	5·02	6·53
Fairfield	6,550	·4	6·7	·00	·30	·30	·30
Granville	15,720	3·9	6·2	·38	·06	·19	·19
Ingleburn	510	·10	9·8	·00	·00	1·96	1.96
Lidcombe	12,560	2·4	41·7	1·11	·08	3·81	3·89
Liverpool	6,580	·3	18·0	·30	·00	·45	·45
Parramatta	15,840	7·1	13·8	·31	·00	·75	·82
Prospect and Sherwood	11,400	1·2⅜	5·1	·08	·00	·17	·17
Hornsby Shire	17,900	·14	7·8	·22	·00	·15	·15
Warringah Shire	13,110	·20	4·6	·22	·00	·22	·22
Total	142,120	....	....	....	....	....	....

DEATHS.

Table 1.

Metropolis.—The recorded deaths for 1925, after correction and including those for institutions totalled 9,386, equivalent to a rate of 9·03 per 1,000 of the population. The rate is 2·9 per cent. below the average of the preceding five years. The number of children under 1 year of age who died was 1,255 or 57·0 per 1,000 births, 10 per cent. below the average of the previous five years.

In the year 1922, the general death rate of 8·16 per 1,000 and the infantile mortality rate of 56 per 1,000 births was not only the lowest ever recorded in the Metropolis, but gave to Sydney the proud distinction of having the lowest death and one of the lowest infantile mortality rates of any city in the world with a population of over 500,000. In 1923 the death rate was 9·6 and the infantile mortality rate 63·9. In 1924 the rates were 9·28 and 57·2 respectively.

Diseases of the Heart.—An analysis of the chief causes of death in the Metropolis shows that the group, diseases of the heart, again occupies the premier position, accounting for 1,472 or a rate of 143 per 100,000.

In 1913, with a mean metropolitan population of 710,100 there were 653 deaths ascribed to diseases of the heart, giving a rate of 92 per 100,000. In 1914 the rate was 98; in 1915, 122; in 1916, 122; 1917, 116; 1918, 119; 1919, 122; 1920, 119; 1921, 117; 1922, 115; 1923, 133; and in 1924, 132. From the above figures it will be seen that there has been a progressive increase in the death rate from diseases of the heart.

It is interesting to compare the position in Sydney with that of Glasgow, where Dr. A. K. Chalmers, the Medical Officer of Health, has shown by selecting the years 1903, 1913 and 1923, as a fairly uniform basis of comparison, for twenty years the death rate from heart diseases seemed to fluctuate rather than fall definitely. It was 160 per 100,000 in 1903; 163 in 1913, and 158 in 1923.

For the Metropolis of Sydney for the same years the death rates from heart diseases were 89, 92 and 133 per 100,000 of population. In Glasgow in 1903 the group of heart diseases formed 9·6 per cent. of the total deaths; in 1913 almost 11 per cent., and in 1923 fully 12 per cent. In Sydney in 1903 heart diseases formed 8 per cent., in 1913 nearly 9 per cent., and in 1923 as much as 15 per cent. of the deaths. In Glasgow in 1903 heart diseases, the foremost group in the causes of death, was followed by tuberculosis of the respiratory system (8·7 per cent.), and pneumonia (8·5 per cent.). In 1923 it stood alone in Glasgow in contributing the largest group among the causes of death, 12·26 per cent., and only after an interval was followed by deaths from cancer, which, however, had increased from 5 per cent. of the total deaths in 1903 to 10 per cent. in 1923. Meanwhile, deaths from pulmonary tuberculosis had fallen to 6 per cent., and pneumonia to 7 per cent.

As in Glasgow in 1923, so also in Sydney in 1925, cancer with a toll of 1,155 was the next chief cause of death, 112 per 100,000 population, actually 12 per cent. of the total deaths. Tuberculosis of the respiratory system in Sydney was only the sixth main cause of death, 389, a decrease of 87 on the previous year, and only 4 per cent. of the total deaths. Pneumonia with 734 deaths in Sydney was the third chief cause of death, 7 per cent. of the total deaths. Bright's disease was the fourth main cause of death, 572, or 5 per cent. of the total. Cerebral hæmorrhage came next with 427 deaths, 4·4 per cent. of the total.

Dr. Chalmers ascribes the apparent increase of diseases of the heart to what he calls the result of denudation, a process akin to what the geologist means by that term. Some diseases without being necessarily more prevalent have become more prominent among the prevailing causes of death owing to differences in the rate of movement. This he thinks largely explains the position occupied by heart disease in the total volume of deaths at the present time.

With regard to the rheumatic affections, the great congener of heart disease, it is interesting to note that in Glasgow in 1923 the group of diseases which forms No. 52 of the international list and includes chronic rheumatism, chronic arthritis, rheumatoid and osteo-arthritis and gout, with rheumatic fever (which is No. 51), gave a death rate of 10·5 per 100,000.

In Sydney in 1925 the rate was only 6 per 100,000. As a matter of fact, of these there were actually 53 deaths from rheumatic fever or 5 per 100,000. It is interesting to note that three-fifths of the deaths in Sydney from rheumatic fever occurred between the ages of 5 and 19 years. There were only 4 deaths from rheumatic fever between 20 and 30 years of age. Contrary to the experience in Glasgow, where rheumatic fever in children over 5 years of age and young adolescents is more fatal to females than males, (a difference which Poynton ascribes to the greater prevalence of chorea in girls), in Sydney in 1925, between the ages of 5 and 24 years, there were more males died from rheumatic fever than females, the figures being 19 and 16 respectively. However, the death rate from heart disease, which shows a progressive increase through successive decades, is higher among females under 15 years in both Glasgow and Sydney, although in the latter the difference is merely that between 9 and 11. Under 25 years in Sydney, in 1925, there were 17 males and 27 females died from heart disease. The great difference as to sex, however, is between the ages of 40 and 75 years. In 1925 in the metropolis of Sydney there were 496 deaths of males from diseases of the heart, and 336 females between the ages of 40 and 75 years. Undoubtedly occupation is the chief factor in this marked difference in the rates in men and women.

The opportunity during the past eight years of examining the employees of the City Council, who now number over 6,000, has convinced me of the factors of occupation and age in the incidence of heart disease and degenerative changes in the arteries. The grading of the physique of the employee to his task by previous medical examination and a more rational vocational selection, together with amelioration of the conditions of hard manual labour in the later working years are suggested. Of the 1,472 deaths from heart disease in the metropolis of Sydney in 1925, only 9 deaths occurred under 5 years of age, 9 from 5 to 9 years, 14 from 10 to 14 years, 7 from 15 to 19 years, and 17 between 20 and 24 years. Heart disease was not therefore a marked cause of death in children and young people. It is interesting to note that the death rate from rheumatic affections in Sydney was nearly half that in Glasgow. In the prevention of some of the primary causes of disease of the heart, such as rheumatic fever, tonsilitis, scarlet fever, pyorrhœa, or the elimination of other foci of septic infection, there is a field for work by the medical inspectors of schools. There is, however, an even wider field for propaganda to make the public realise that much of the so-called heart disease, degenerative changes in the arteries, and the now popular diagnosis of high blood pressure is preventible by a campaign against syphilis and alcohol, the elimination of lead poisoning, and the prevention of over fatigue both in work and play of men over fifty. Whilst adults should be encouraged to submit to a yearly medical examination, emphasis should be at least laid on the need for at least an examination at 40 and each later decennial period of life.

Cancer.—One of the most dreaded diseases to which human flesh is heir, with a terrible toll of 1,155 deaths in the metropolis and 211 in the extra metropolitan area, comes next on the list of killing diseases. Both the Central Health Department by posters, and the City Council by leaflets, freely distributed, have engaged in propaganda warning people not to delay in having recourse to the skilled surgeon for the removal of the first evidences of this malignant disease. 573 males and 583 females died from cancer in 1925; 60 to 70 years of age was the most fatal period in both sexes.

As to the site of the disease and the association therewith of chronic irritation as a determining factor, it is noted that only 6 females died from cancer of the buccal cavity (mouth), compared to 65 males so affected, suggestive of smoking as a possible source of irritation and a warning to men to immediately seek advice with regard to any sore on the lip or tongue. Again, the fact that 178 males and 72 females were recorded as having died from cancer of "other or unspecified organs" suggests a tabulation of the deaths more extensively, or that there should be more care shown in filling in death certificates.

Pneumonia follows as the next most important cause with 734 deaths. As the late Sir William Osler pointed out, this is "one of the most wide-spread and fatal of all acute diseases, and has been the 'captain of the men of death'" to use the phrase applied by John Bunyan to consumption. From broncho pneumonia the deaths of males were 131, of females 141. From pneumonia (other) it is noticeable that after 30 years of age half as many more men as women died of this disease. It is suggested that the inhalation of dust in certain occupations and indulgence in alcohol rather than exposure in a climate such as ours, are the main factors causing this difference in sex incidence in the second half of life.

Bright's Disease (acute and chronic) claimed 572 victims. Acute nephritis, often a sequela of scarlet fever, measles, or diphtheria only accounted for 18 males and 13 females. Chronic nephritis was the cause of death of 318 males and 223 females. The exceptionally high incidence of nephritis between 45 and 70 years in males may be due to occupation and to over-eating, especially of meat.

Cerebral hæmorrhage accounted for the deaths of 211 males and 213 females. It would be interesting to find out how often this condition is associated with syphilis.

Pulmonary Tuberculosis.—It is worthy of note that tuberculosis of the lungs has actually fallen to the seventh place as the cause of death in Sydney, there actually now being more deaths ascribed to accidents than to this disease. In 1925 there were 389 deaths from tuberculosis of the respiratory system, a decrease of 87 on the average of the previous five years. The intensive propaganda on the prevention of tuberculosis, the sanatorium instruction, and the recognition of the need for good feeding and living in the open air, have no doubt contributed to the marked fall in tuberculosis.

Epidemic Diseases.—Whooping cough has, unfortunately, shown a distinct increase, accounting for the deaths of 54 males and 70 females, the incidence under 5 years of age being 52 and 63 respectively. The total increase was 48 per cent. on the average of 84 for the previous five years. Scarlet fever caused the death of 5 males and 9 females, in contrast to an average total of 8 deaths for the previous five years. Typhoid fever, 32; measles, 11; diphtheria, 61; influenza, 51; infantile paralysis, 2; and epidemic cerebro-spinal meningitis showed decreases of 24, 75, 36, 58, 60 and 23 per cent. respectively on the average for the previous five years.

Lethargic encephalitis accounted for 16 deaths, the average for the previous five years.

Diabetes accounted for 133 deaths, a decrease of 9 on the average for the previous five years. The majority of deaths occurred in the sixth decade of life, later on the average than in England and the United States. As noted in previous years, contrary to the usual incidence in those countries, in Sydney women die more frequently than men from diabetes. The usual incidence is in the ratio of 3 men to 2 women, but in Sydney the reverse usually obtains, the ratio being 3 women to 2 men, or 70 to 99 in 1924, whilst in 1925 there were actually 80 females died from diabetes and 53 males.

As this disease is more common in those not engaged in manual labour, and the predisposing causes are stated to be severe nervous strain and worry, it is suggested that the absence of domestic help may be a factor in the relatively unusually high incidence among elderly women in Sydney.

Diarrhœa and enteritis accounted for 303 deaths, a contrast to 596 for the previous five years. A decrease of 54 per cent. for those of two years and over, and of 46 per cent. of deaths of children under two years, is exactly the same as the decrease in 1924, compared to the figure of 1923. This is probably the most gratifying feature in the vital statistics in the metropolis.

Maternal Mortality.—It is pleasing again to record, as in the previous two years, a reduction in the number of deaths from the preventable disease, puerperal septicæmia. There were 35 deaths in childbirth from puerperal septicæmia in the metropolis in 1925, of which 23 were in mothers under 30 years of age. The reduction was 24 per cent. below the average of the preceding five years. There were, however, 122 deaths from other puerperal diseases, an increase of 18 on the number in 1924, and an increase of 12 per cent. on the average of the previous five years.

There were 34 deaths from puerperal albuminaria and convulsions, a strong argument for prematernity supervision. Puerperal hæmorrhage caused 18 deaths, and 14 were ascribed to "other accidents of labour." One hundred and eleven deaths of women in the metropolis, either in or actually after childbirth, gives a death rate in childbirth or associated therewith, of 5 per 1,000 births, the lowest yet recorded, and 1 per 1,000 less than in the previous year. Five deaths from ectopic gestation, 3 from other accidents in pregnancy, and 39 from illegal operations are not included in the above figures. It will be of interest to note whether the maternal mortality rate in the metropolis, as has hitherto been the case, is contrary to the experience in most countries, actually higher than in the country centres. Possibly the increased attention recently given to this subject has been a factor in the undoubted improvement, whilst the more intensive training of the future practitioners and increased provision of lying-in facilities, together with more prematernity supervision, is bound to have a beneficial effect.

Infantile Mortality.—The deaths of infants under 1 year of age in the metropolis as recorded by the Government Statistician during 1925, numbered 1,255, whilst the births numbered 22,036, giving an infantile mortality rate of 57·0 per 1,000 births. The rate is 10 per cent. below the average of the previous five years. The actual average infantile mortality rate for the last five years, including 1925, was 59·8; the average infantile mortality for the previous five-yearly periods, 1916–1920, was 68. The years 1919 and 1920 were years of high infantile mortality, being 79 and 74 per 1,000 births.

From 1904, synchronising with the visitation of mothers by nurse inspectors of the City Council and later of the Public Health Department, there was a progressive decline in infant mortality from 98 to 62 per 1,000 births. During the years previous to 1914 an investigation of all fatal cases showed that the incidence of gastro-enteritis was highest in artificially-fed infants. The proportion of entirely breast-fed children found on first visits in 1904 was 72·2 per cent. of all those visited; in 1911 it had risen to 82·5 per cent., in 1913 to 90·4 per cent., and in 1914 to 93·2 per cent. The increased percentage in the year 1913–1914 was ascribed to the fact that the children were seen on an average at an age of a fortnight younger than in the previous years, as a result of the introduction of the baby bonus, artificial feeding increasing in proportion to the age of the child.

Of the deaths in 1925 from diseases associated with infant mortality there was a marked increase from whooping cough.

The gratifying reduction of deaths from other developmental diseases, noted in the previous two years, was maintained.

Of the total 1,255 deaths in the first year of life, no less than 510 occurred in the first week, and a total of 648, or more than half in the first month. It is a matter of general comment how in practically all countries except Holland, with its excellent system of State and municipal midwives, in spite of the general reduction in infantile mortality, there has been little change in the death rate in the first month of life. Of deaths from prematurity, congenital debility, injury at birth, and other diseases peculiar to early infancy, 418 out of 555 died during the first week. One of the main causes of death in infants—diarrhœal diseases—caused 211 deaths, a reduction of 13 and 139 on that of the previous two years.

TABLE 2.—(*a*) Showing Deaths of Children under 1 year per 1,000 births from 1880 to 1925, and (*b*) Deaths of Infants in the Metropolis from various causes 1915–1925.

(*a*)—Infantile Mortality per 1,000 Births, 1880–1925.

Year.	Deaths of Children under 1 year per 1,000 births.	Year.	Deaths of Children under 1 year per 1,000 births.	Year.	Deaths of Children under 1 year per 1,000 births.	Year.	Deaths of Children under 1 year per 1,000 births.
1880	192	1892	130	1904	98	1916	68
1881	162	1893	147	1905	89	1917	59
1882	183	1894	134	1906	84	1918	62
1883	163	1895	131	1907	96	1919	79
1884	172	1896	139	1908	82	1920	74
1885	187	1897	129	1909	81	1921	63
1886	173	1898	153	1910	82	1922	58
1887	141	1899	120	1911	71	1923	64
1888	152	1900	109	1912	76	1924	57
1889	172	1901	120	1913	78	1925	57
1890	135	1902	112	1914	69		
1891	148	1903	116	1915	72		

(*b*)—Showing Deaths of Infants under 1 year of age in the Metropolis from various causes, 1915–25.

Cause of Death.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.
Measles	29	5	3	8	1	20	3	1	6	2	1
Whooping-cough	14	60	19	26	17	121	27	24	24	16	68
Diphtheria and croup	16	22	14	14	6	11	11	10	12	5	10
Influenza	1	1	2	3	42	6	7	1	9	4	6
Cerebro-spinal meningitis	4	13	6	5	3	2	1	3	2	6	2
Tuberculous meningitis	7	5	5	8	4	1	9	8	2	3	1
Other tuberculous diseases	6	7	...	4	1	3	5	2	2	1	2
Meningitis	14	11	6	12	8	7	14	10	19	19	12
Convulsions	33	28	27	20	22	22	18	15	11	13	12
Other nervous diseases	10	5	4	1	6	8	4	1	2	3	1
Bronchitis	19	34	22	21	18	26	20	21	29	17	18
Pneumonia	125	129	95	102	124	126	101	132	129	138	132
Other respiratory diseases	5	4	6	...	8	12	6	2	2	4	3
Diseases of the stomach	10	10	11	12	8	11	12	6	6	5	5
Diarrhœa and enteritis	422	328	279	222	411	443	385	257	407	224	191
Intestinal obstruction and hernia	13	10	11	10	19	10	17	7	8	9	9
Bright's disease	5	1	2	3	3	...	2	2	...	5	...
Prematurity	417	369	307	351	409	440	379	362	379	382	354
Other developmental diseases	302	327	333	337	307	319	332	351	299	237	282
Accident	9	12	10	11	10	12	9	7	10	13	11
All other causes	55	47	50	55	56	58	52	57	47	156	66
Total	1,516	1,428	1,212	1,225	1,483	1,658	1,414	1,279	1,405	1,262	1,186

An analysis of the mortality shows that 81 infants died of gastro-enteritis between the ages of 6 and 12 months, 90 in the third, fourth and fifth months, and 33 in the second month according to the records of the Government Statistician.

The deaths of infants from gastro-enteritis as a rule are related to the mean monthly temperature, the maximum temperature, and the rainfall.

Deaths from diarrhœa and enteritis under two years in May, June, July, August, September, October, and November were 17, 14, 16, 7, 11, 6 and 11, the months with the lowest mean temperature. In December, with a mean temperature of 70·4, there were 25 deaths from diarrhœa and enteritis; in January mean temperature 69·4, 30 deaths; February, mean temperature 72·6, 29 deaths; March, mean temperature 68·1, 46 deaths; April, mean temperature 66·2, 41 deaths.

The highest maximum temperature was in December. The highest rainfall was in May and the lowest in October.

It thus will be seen that whilst in the warmer months enteritis is most prevalent there is some other factor, possibly the presence of flies, from December to April which accounts for the higher incidence of the disease in these months.

TABLE 3.—Table showing for the metropolis the population, number of deaths, and the death-rate per 1,000, together with deaths of children under 1 year and the infantile death-rate per 1,000 births during the last twenty years:—

Year.	Number of Deaths.	Ratio per 1,000 Living.	Deaths of Children under 1 year.		Year.	Number of Deaths.	Ratio per 1,000 Living.	Deaths of Children under 1 year.	
			Total.	per 1,000 Births.				Total.	per 1,000 Births.
1906	5,703	10·35	1,176	84·1	1916	8,156	10·68	1,428	68·5
1907	6,238	10·97	1,380	96·3	1917	7,518	9·75	1,212	59·8
1908	6,036	10·32	1,229	82·7	1918	7,862	10·02	1,225	62·7
1909	6,149	10·27	1,261	81·6	1919	11,907	14·69	1,483	79·4
1910	6,365	10·36	1,329	82·0	1920	11,449	12·21	1,852	73·9
1911	6,973	10·90	1,268	71·1	1921	8,276	9·07	1,414	63·0
1912	7,681	11·37	1,530	76·0	1922	8,043	8·16	1,239	56·0
1913	7,938	11·18	1,608	78·3	1923	9,351	9·65	1,405	63·9
1914	7,603	10·26	1,452	69·7	1924	9,185	9·29	1,418	56·8
1915	8,189	10·81	1,516	72·6	1925	9,377	9·15	1,255	57·0

Deaths from Accidents.—There has been an increase unfortunately of 9 per cent. in the number of fatal accidents on the average for the previous five years.

The total number of fatal accidents in the metropolis in 1913 was 352, whereas in 1922 the number actually dropped to 325, in spite of the fact that the population had increased by a quarter in the intervening ten years.

In 1925 there were in the metropolis 412 fatal accidents (including 49 deaths from burns, 21 males and 28 females).

It is gratifying to note that deaths from drowning fell from 46 in 1913 to 28 last year. The fact that 45 males died from accidents on railways and tramways, 124 from vehicles and horses (an increase of 36 on the previous year) may as to the latter be due to the serious congestion in the main arteries of traffic.

Many lives are undoubtedly saved by the wonderful life-saving organisations on our beaches and by the safety-first campaigns of the Railway Commissioners and the Police.

Investigations in England and the United States show that 65 per cent. of all accidents are attributable to negligence, carelessness, lack of thought, and above all *lack of appreciation of danger.*

Every encouragement should be given to propaganda to inculcate the ideas of safety first, and to secure provision and training in First Aid.

METEOROLOGY.

The following table, compiled from information supplied by the Sydney Weather Bureau, shows that the mean temperature of the air in Sydney during 1925 was 63·1 degrees Fahrenheit, which equals the mean of 66 years' observation.

An examination of the monthly means shows that the mean temperature was above the average during the months of February, April, May, June, July and December, and below during the other six months.

December and February were the warmest months of the year, whilst July was the coldest.

The rainfall for the year was 2·77 inches above the average of 66 years.

The heaviest monthly rainfall was during the month of May, 20·03 inches, and the lowest in July, 0·25 inches.

TABLE 4.—Temperature and Rainfall, 1925.

	Temperature in Shade.			Departure of Mean Monthly Temperature from Average of 66 Years. (+ or —)	Rainfall.		
	Max. Extreme.	Min. Extreme.	Mean for Month.		Number of Rainy Days.	Amount Inches.	Departure of Amount from Average of 66 Years. (+ or —) In Inches.
January	6·94	53·0	9·76	— 2·3	15	4·72	+ 1·07
February	87·3	59·4	72·6	+ 1·4	9	1·93	— 2·40
March	82·3	51·4	68·1	— 1·2	15	3·04	— 1·88
April	84·0	50·8	66·2	+ 1·6	14	2·08	— 3·34
May	75·2	48·6	60·6	+ 1·8	19	20·03	+ 14·99
June	70·0	45·6	57·2	+ 2·6	18	5·97	+ 1·19
July	69·0	41·2	53·5	+ 0·9	6	0·25	— 4·72
August	75·0	40·3	53·8	— 1·2	13	4·85	+ 1·83
September	75·3	43·8	57·4	— 1·8	5	0·84	— 2·06
October	93·0	45·9	62·4	— 1·1	11	0·76	— 2·15
November	97·0	51·1	66·0	— 1·0	11	4·75	+ 1·93
December	104·3	56·0	70·4	+ 0·3	9	1·13	— 1·69
Means and totals for the year 1925	...	...	63·1	+ 0·0	145	50·35	+ 2·77

INFECTIOUS DISEASES.

TABLE 5—Showing cases of Scarlet Fever, Diphtheria and Typhoid Fever notified in the metropolis and extra metropolitan districts, together with attack rates per 1,000 of the estimated mean population, year 1925.

Municipality.	Scarlet Fever.				Diphtheria.			Typhoid Fever.		
	Estimated Mean Population.	Cases Notified.	Attack Rate per 1,000 Living.	Death Rate per 1,000 Living.	Cases Notified.	Attack Rate per 1,000 Living.	Death Rate per 1,000 Living.	Cases Notified.	Attack Rate per 1,000 Living.	Death Rate per 1,000 Living.
Metropolitan Districts.										
City of Sydney	107,920	113	1·02	·00	142	1·31	·07	15	·13	·009
Alexandria	10,030	14	1·09	·00	20	1·99	·19	2	·19	·099
Annandale	12,790	17	1·33	·00	17	1·33	·00	1	·07	·000
Ashfield	37,260	69	1·85	·00	35	·94	·02	4	·10	·027
Balmain	32,470	20	·61	·00	29	·89	·06	3	·09	·061
Bexley	17,130	55	3·21	·00	21	1·22	·00	3	·17	·000
Botany	6,730	15	2·22	·00	30	4·45	·29	1	·14	·28
Burwood	17,710	53	2·99	·00	20	1·12	·00	1	·05	·056
Canterbury	53,250	156	2·92	·03	67	1·25	·11	8	·15	·018
Concord	16,980	27	1·06	·06	29	1·71	·00	4	·23	·000
Darlington	3,650	6	1·64	·00	2	·54	·00	......	·00	·000
Drummoyne	23,520	26	1·10	·00	24	1·02	·00	2	·08	·000
Eastwood	2,530	1	·39	·00	5	1·97	·00	......	·00	·000
Enfield	11,180	46	4·11	·00	33	2·86	·08	1	·09	·000
Erskineville	7,560	13	1·72	·00	11	1·45	·00	2	·26	·000
Glebe	22,930	30	1·30	·00	32	1·39	·09	5	·22	·000
Homebush	2,550	9	3·53	·39	1	·39	·00	1	·39	·000
Hunter's Hill	8,650	10	1·15	·00	9	1·05	·00	6	·69	·116
Hurstville	16,900	44	2·60	·05	33	1·95	·00	3	·18	·000
Kogarah	22,880	106	4·63	·04	58	2·53	·08	2	·08	·043
Lane Cove	12,330	27	2·19	·00	25	2·02	·16	2	·16	·081
Leichhardt	30,180	35	1·16	·03	50	1·65	·03	3	·09	·000
Manly	23,040	9	·38	·00	19	·82	·00	4	·17	·000
Marrickville	44,660	97	2·17	·02	55	1·17	·00	20	·44	·134
Mascot	11,790	13	1·10	·00	32	2·71	·08	3	·25	·000
Mosman	22,610	17	·75	·00	9	·39	·00	3	·13	·088
Newtown	28,360	44	1·55	·00	43	1·51	·07	2	·07	·000
North Sydney	51,810	59	1·13	·00	58	1·11	·07	9	·17	·057
Paddington	26,640	36	1·35	·00	70	2·62	·03	5	·18	·037
Petersham	27,090	41	1·51	·00	27	·99	·11	4	·14	·036
Randwick	62,360	94	1·50	·01	89	1·42	·00	21	·33	·016
Redfern	24,070	36	1·49	·00	28	1·16	·12	5	·20	·083
Rockdale	30,470	76	2·49	·00	51	1·67	·03	6	·19	·032
Ryde	19,640	43	2·18	·00	34	1·73	·05	......	·00	·000
St. Peters	13,200	26	1·97	·00	21	1·59	·15	2	·15	·000
Strathfield	10,350	26	2·51	·00	10	·96	·00	......	·00	·000
Vaucluse	5,360	3	·56	·00	8	1·49	·00	2	·37	·000
Waterloo	11,600	22	1·89	·00	25	2·15	·00	1	·08	·000
Waverley	44,690	76	1·70	·04	50	1·11	·04	9	·20	·000
Willoughby	36,380	46	1·26	·00	63	1·70	·11	12	·32	·027
Woollahra	29,940	32	1·06	·00	25	·83	·06	1	·03	·000
Kuring-gai Shire	23,059	17	·73	·04	18	·78	·00	9	·38	·000
Total, Metropolis ...	1,024,240	1,705	1·66	·01	1,428	1·39	·053	187	·18	·029
Extra Metropolitan Districts.										
Auburn	16,390	61	3·72	·12	27	1·64	·00	4	·24	·061
Bankstown	15,120	15	·99	·07	19	1·25	·00	2	·13	·000
Cabramatta and Canley Vale.	3,820	2	·52	·00	......	......	·00	......	·00	·000
Dundas	4,610	11	2·38	·00	13	2·82	·00	......	·00	·000
Ermington and Rydalmere.	1,990	......	·00	·00	......	......	·00	1	·40	·000
Fairfield	6,550	17	2·59	·15	6	·90	·00	......	·00	·000
Ingleburn	480	1	2·08	·00	2	3·82	·00	......	·00	·000
Granville	15,720	27	1·71	·00	12	·76	·00	13	·82	·000
Lidcombe	12,580	31	2·46	·08	20	1·59	·00	2	·15	·000
Liverpool	6,580	3	·45	·00	3	·45	00	1	·15	·000
Parramatta	15,840	24	1·51	·12	26	1·66	·00	7	·44	·000
Prospect and Sherwood ...	11,400	21	1·84	·00	9	·78	·00	2	·17	·000
Hornsby Shire	17,900	18	1·05	·16	22	1·23	·00	3	·17	·000
Warringah Shire	13,110	8	·68	·16	21	1·60	·00	1	·07	·000
Extra Metropolitan Municipalities and Shires.	142,090	239	1·68	·08	180	1·26	·00	36	·25	·006
Combined Totals	1,166,330	1,944	1·66	·02	1,608	1·37	·011	223	·19	·026

TABLE 6.—Notified Scarlet Fever in the Metropolis since notification became legal, showing Incidence and Mortality.

Year.	Cases.	Attack-rate per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.	Year.	Cases.	Attack-rate per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.
1898	2,425	5·37	25	1·03	0·07	1912	304	0·45	6	1·9	0·008
1899	556	1·20	10	1·80	0·02	1913	555	0·79	12	2·16	0·002
1900	464	·098	5	1·07	0·01	1914	1,717	2·32	16	0·9	0·02
1901	884	1·82	13	1·41	0·02	1915	4,190	5·53	48	1·14	0·07
1902	1,253	2·54	38	3·03	0·07	1916	2,468	3·24	38	1·53	0·05
1903	2,910	5·77	48	1·65	0·09	1917	1,110	1·44	9	0·8	0·01
1904	1,361	2·40	14	1·03	0·02	1918	637	0·81	11	1·7	0·01
1905	1,136	2·15	16	1·41	0·03	1919	376	0·46	7	1·86	0·008
1906	1,869	3·44	22	1·17	0·04	1920	346	0·41	5	1·44	0·006
1907	976	1·72	11	1·12	0·02	1921	407	0·44	5	1·22	0·005
1908	1,153	2·00	20	1·73	0·03	1922	554	0·58	4	0·74	0·004
1909	836	1·41	8	0·9	0·01	1923	1,369	1·41	8	0·58	0·008
1910	394	0·65	9	2·28	0·01	1924	1,921	1·92	12	0·62	0·001
1911	369	0·57	3	0·81	0·004	1925	1,705	1·66	13	0·76	0·001

A glance at the above table will show that during the past three years the incidence of scarlet fever has been higher than in the previous five years. Apparently there are periods of comparative quiescence followed by years, as at present, of increased incidence, a phenomenon to which Sir William Hamer has directed attention in London.

It is gratifying to note, however, that whilst the attack rate has increased, the actual death rate per 1,000 of population has decreased. In various reports during the past eighteen years, I have directed attention to the general type of scarlet fever being less virulent in Australia and New Zealand than in England, where it is also to some extent becoming a less serious disease. Perhaps it might be more correct to say that the resisting power generally to the disease is proportionately higher in Australia and New Zealand, as it cannot be claimed to be due to acquired immunity.

With regard to all cases notified, inquiry is made as to the possible sources of contagion, especial attention being directed to the milk supply and care being taken to secure exclusion of contacts from schools. It has been considered advisable to still carry out household disinfection as a matter of routine. As a matter of fact, as a rule the mess made by disinfection ensures a thorough cleaning or, at least, an airing of the house afterwards.

TABLE 7.—Notified cases of Diphtheria in the Metropolis and extra metropolitan areas since notification became legal, showing Incidence and Mortality in each year.

Year.	Cases.	Attack-rate per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.	Year.	Cases.	Attack-rate per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.
1898	613	1·43	75	12·23	·16	1912	2,632	3·92	105	3·9	·15
1899	285	·66	14	4·91	·03	1913	2,841	2·89	96	4·70	·13
1900	278	·63	21	7·55	·05	1914	2,011	2·67	95	4·72	·11
1901	439	·95	65	14·82	·13	1915	2,295	3·03	95	4·13	·14
1902	393	·79	37	9·41	·07	1916	2,585	3·39	111	4·20	·15
1903	690	1·37	73	10·60	·14	1917	2,261	2·94	72	3·18	·09
1904	738	1·40	45	6·10	·08	1918	2,085	2·65	87	4·17	·11
1905	695	1·19	42	6·60	·07	1919	859	1·059	37	4·30	·04
1906	659	1·21	32	4·85	·05	1920	1,618	1·92	90	5·46	·106
1907	659	1·16	46	6·98	·08	1921	2,475	2·709	90	3·63	·098
1908	880	1·53	38	4·20	·06	1922	1,513	1·607	62	4·09	·066
1909	1,144	1·93	42	3·70	·07	1923	1,485	1·53	77	5·18	·079
1910	2,109	3·47	61	2·89	·10	1924	1,847	1·85	75	4·06	·075
1911	1,834	2·86	58	3·16	·09	1925	1,428	1·39	55	3·85	·053

The incidence of diphtheria in the metropolis in 1925 showed a decrease of 419 cases on that of the previous year, whilst the death-rate per 1,000 of population was with the exception of 1919, the lowest yet recorded. The reduction in the case fatality rate is probably due to more prompt treatment with anti-toxin. The highest attack rate was in the Municipality of Botany, 4·45 per 1,000, represented by 30 cases in a population of 6,730. Kogarah, with 58 cases in a population of 22,880, had the next highest attack rate —2·55 per 1,000. Homebush, with an attack rate of ·39 per 1,000, had the best record.

The experience of diphtheria in the metropolitan area shows that the mere introduction of drainage into an area, whilst admittedly improving the general health of the residents, does not prevent outbreaks of diphtheria or materially lessen its incidence.

The isolation of cases and more general supervision of school children undoubtedly, however, is a factor in preventing the spread of the disease. Many medical practitioners, when there is the least suspicion of diphtheria, follow the "Safety First" principle of giving anti-toxin first, and taking swabs secondly to verify the diagnosis, rather than risking the delay incidental to a bacteriological examination.

Immunisation.—The best way to lessen the incidence of diphtheria would be to protect the whole child population with toxin anti-toxin without a preliminary Schick test. Where the child gave a negative test no harm would be done, whereas the procedure would be simplified if universally applied with, of course, the consent of the parents. Certainly in all orphanages and institutions where children are segregated in large numbers all inmates should be protected as a matter of routine.

TYPHOID FEVER.

TABLE 8.—Notified cases of Typhoid Fever in the Metropolis and Extra Metropolitan area since notification became legal, showing incidence and mortality in each year.

Year.	Cases.	Attack-rate per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.	Year.	Cases.	Attack-rate* per 1,000 of Population.	Deaths.	Case-fatality per cent.	Death-rate per 1,000 of Population.
1898	824	1·93	73	8·86	·17	1912	535	·80	53	9·9	·07
1899	786	1·81	87	11·08	·20	1913	566	·81	59	10·42	·09
1900	983	2·25	103	10·47	·23	1914	616	·81	82	13·31	·11
1901	829	1·71	81	9·77	·17	1915	746	·98	74	9·91	·11
1902	610	1·23	59	9·70	·12	1916	613	·80	65	10·06	·09
1903	833	1·66	81	9·72	·16	1917	371	·48	27	7·27	·04
1904	665	1·29	64	9·62	·12	1918	297	·37	51	17·1	·06
1905	561	1·06	58	10·34	·11	1919	300	·37	53	17·6	·06
1906	485	·89	60	12·37	·11	1920	322	·38	45	13·97	·05
1907	505	·89	51	10·09	·09	1921	311	·34	44	14·14	·04
1908	678	1·17	75	11·06	·13	1922	221	·29	41	18·5	·04
1909	700	1·18	81	11·50	·14	1923	217	·22	27	12·4	·028
1910	812	1·33	84	10·34	·13	1924	184	·18	18	9·80	·01
1911	488	·76	50	10·24	·08	1925	187	·18	30	16·05	·029

Typhoid Fever Incidence.—With 187 cases notified in the metropolis for 1925, there was an increase of three cases on the number for the previous year. The attack rate of ·18 per 1,000 of population, which has obtained for the past two years, is the lowest recorded. The high case fatality of 16 per cent. suggests that a number of cases are either not notified or not diagnosed as typhoid. It is unlikely that with modern treatment the case fatality should be much over 10 or 12 per cent. unless we are dealing with a more virulent type of the disease.

No cases were reported from Darlington, Eastwood, Ryde and Strathfield. Annandale, Botany, Burwood, Enfield, Homebush, Waterloo and Woollahra had each a single case. Randwick with 21 cases, Marrickville with 20, and Hunter's Hill with 6 in a population of 8,650, with the highest attack rate of ·69 per 1,000, had the worst record. It is pleasing to note that Canterbury, a great unsewered area with a population of 53,250 only had 8 cases, the attack rate being ·15 per 1,000.

Mortality.—The deaths from typhoid fever in 1925 numbered 30, 12 more than in 1924. The death rate per 100,000 of population was 2·9.

In reviewing the progress of a community from a sanitary standpoint, the feature most coincident with improved sanitation is a reduction of the morbidity and mortality from typhoid fever. The death rate from typhoid fever is now a seventeenth of what obtained in the metropolis of Sydney forty years ago. Thus giving the death rate for 100,000, we find that the typhoid death rate in Sydney has fallen from 51·3 for the years 1888–1890, to 21·6 for 1891–1900, to 13·2 for 1901–1910, to 11·8 for 1910–1915, 6 for 1916–1920, and 2·9 for 1921–1925.

In the Extra Metropolitan district in 1925 there were 36 cases of typhoid, 24 less than in the previous year. There were 13 cases in Granville. No cases were reported from Dundas or Cabramatta and Canley Vale. As most of the area outside the metropolis is still unsewered, the extension of sewerage not having kept pace with development and the great increase of population, it is fortunate that there has been no serious epidemic of typhoid.

As far as possible all cases are removed to hospital. Local inspectors make a special investigation of the circumstances of each case, ascertain that a separate emergency pan service is provided, and that stools are disinfected and if possible incinerated. The milk supply is carefully watched, and suspicious cases of carriers reported and examined bacteriologically. It is always a matter of wonder to me, however, that in such a great centre of population as Sydney the sanitary conscience of the community is not aroused to the need for accelerating the extension of the sewerage system to at least three times its present rate of progress. In almost every direction there are large segregations of people who still have to tolerate a dry conservancy system. In the municipality of Canterbury alone there is a service of 13,000 pans a week. Apart however, from the actual removal and disposal of excreta, there is the problem of the disposal of household waste. The impossibility of each household disposing of its waste waters within its own grounds, as prescribed by Local Government Ordinance, is obvious to anyone passing through some of the suburbs where houses are not infrequently built on land with a natural slope to the front street, which in many cases is without a water table. In some districts there are open drains, natural water courses, or creeks to which sewage polluted drainage naturally gravitates. Many of the ditches are in summer choked with weeds and other vegetation, affording breeding places for mosquitoes.

Two other potential sources of typhoid are the promiscuous picking of oysters from polluted portions of the harbour foreshore, and the occasional washing of vegetables in water other than from the Metropolitan Water Supply.

Tuberculosis.—The number of deaths from all forms of tuberculosis in the metropolis proper during 1925 was 551, of which 482 were due to tuberculosis of the lungs, 26 to tubercular meningitis, and 43 to other tubercular diseases. This total includes 95 deaths from phthisis, which occurred at Waterfall Sanatorium, as well as deaths from phthisis of former metropolitan residents which occurred in benevolent asylums.

The appended table represents, as accurately as possible, the true number of deaths from phthisis which might be debited to the metropolis proper for each of the past twenty-one years :—

1905	495	1911	541	1916	623	1921	532
1906	498	1912	494	1917	482	1922	494
1907	512	1913	521	1918	507	1923	539
1908	504	1914	601	1919	654	1924	584
1909	458	1915	658	1920	536	1925	482
1910	495						

For the metropolitan combined sanitary district, 1,051 cases of pulmonary tuberculosis were notified during 1925, showing a decrease of 102 cases in the number for the year. Of these notifications 653 were males and 398 females; 138 cases were notified from the city proper (of whom 8 were Chinamen), and 83 from the Blue Mountains district (63 males and 20 females).

AGE GROUPS.

Table A.

City and Metropolitan Combined Sanitary District.

		Forward	450
Under 1 year	2	35–44 years	226
1–4 years	4	45–54 „	134
5–14 „	29	55–64 „	82
15–24 „	172	65 and over	37
25–34 „	243	Ages not stated	122
			1,051

Table B.

Blue Mountain Shire and Katoomba and Blackheath Municipalities.

		Forward	40
Under 1 year	—	35–44 years	29
1–4 years	—	45–54	9
5–14 „	—	55–64 „	4
15–24 „	8	65 and over	—
25–34 „	32	Ages not stated	1
			83

The home visiting of notified tubercular patients is carried out by Nurse-Inspector Fletcher, R.S.I. (Metropolitan Health Office Staff) and Nurse-Inspector Blomfield, R.S.I. (Sydney Municipal Council), visiting nurses attached to the Anti-Tuberculosis Clinics of the Royal Prince Alfred and Royal North Shore Hospitals, the Anti-Tuberculosis Dispensary and the Red Cross Organisation. Overlapping in home visiting has been considerably diminished since the conference of the nurses concerned.

During the year 319 disinfections were carried out by local authorities after removal or death of notified cases of pulmonary tuberculosis. Notices with regard to damp and insanitary dwellings occupied by tubercular patients were served through the local authorities.

In 62 instances medical practitioners omitted to notify cases of tuberculosis until their attention was drawn thereto.

Infantile Paralysis.—There were 38 cases recorded in the metropolis and 3 in the extra metropolitan district during 1925. Of the 41 cases notified for the whole of the metropolitan combined sanitary district, only one, (a case in the city) proved fatal. Half the cases occurred in December—contrary to experience in previous years, when more than half the cases were reported in April and May. The incidence was similar to that of the previous year, which was five times that of 1922.

The following is a record of the disease in the metropolis since it was declared notifiable in 1912:—

1912	28	cases notified.	1919	8	cases notified.
1913	32	„	1920	37	„
1914	63	„	1921	19	„
1915	48	„	1922	12	„
1916	186	„	1923	62	„
1917	6	„	1924	42	„
1918	11	„	1925	38	„

The general opinion with regard to this disease is that it is spread by direct contact from the sick to the well through naso-pharyngeal, buccal, and intestinal discharges.

At the request of the Lord Mayor of Sydney (Alderman P. B. Stokes, M.L.A.), I spent a month in New Zealand during the height of the severe epidemic there, and had the opportunity of meeting the medical profession in conferences with regard thereto at Auckland and Mount Cook. The outbreak of over a thousand cases in New Zealand began during the latter part of November, 1924, and reached its maximum towards the end of February, 1925.

At the Auckland meeting of the British Medical Association early in February, 1925, I pointed out the similarity of the graph of the seasonal incidence of infantile paralysis to the incidence of typhoid in a severe epidemic in Auckland in 1908 during my appointment as District Health Officer. Dr. Tillyard, Entomologist to the Cawthorn Institute, Nelson, New Zealand, endorsed my observations as to the seasonal occurrence of the epidemic in New Zealand in the different provinces, synchronising with the period of flight of the stable fly (*Stomoxys calcitrans*). Although the idea of fly convection is now not much held, one was struck with the fact that in Auckland the outbreak was not marked in the more congested portions of the city. Having previously pointed out in Auckland that the growing of roses, owing to the practice of mulching with horse manure, was the reason for the prevalence of flies in certain houses, it was interesting to note that the disease was well marked in the better class garden suburbs. Unlike the New Zealand outbreak in 1916, the incidence did not follow the main lines of communication.

When visiting Whangarei I found there were three cases from places 40 miles apart. In these cases from very isolated settlements the "carrier" theory had to be considerably strained as an explanation.

It is worthy of note that in the last serious outbreak in Sydney in 1916, half of the 186 cases in the metropolitan area occurred in March and April. The prophetic warning of a colleague of an epidemic said to be due in Sydney fortunately has been postponed. As Voltaire remarks: It is never safe to foretell the future; there has never been any. However, the Superintendent and Medical Staff of the Royal Alexandra Hospital for Children carefully watch all cases of infantile paralysis, and are ever on the *qui vive* at the least sign of sporadic outbreaks becoming epidemic.

I was convinced by my visit to New Zealand that it is not advisable to close all schools, but to keep the children under observation, relying on exclusion and seclusion of cases. Although nothing is evidently to be gained by household disinfection, I am of opinion that full advantage should always be taken to get a good general clean-up, when the public is not only willing but anxious to co-operate with the authorities.

Epidemic Cerebro-spinal Fever.—There were 13 cases notified, including 8 deaths from epidemic cerebro-spinal meningitis, distributed as follows:—City of Sydney, 2; Canterbury, 1; North Sydney, 2; Petersham, 1; Randwick, 1; Redfern, 1; St. Peters, 1; Waterloo, 2; Willoughby, 1, Ku-ring-gai Shire, 1. In the extra metropolitan area there were three cases, one each at Auburn, Bankstown and Hornsby Shire.

The following is the mortality record in the metropolis:—

1915	43 deaths.	1921	12 deaths.
1916	62 ,,	1922	7 ,,
1917	33 ,,	1923	8 ,,
1918	25 ,,	1924	15 ,,
1919	14 ,,	1925	8 ,,
1920	12 ,,		

PARKS, RESERVES AND PLAYGROUNDS.

In Australia especially in our cities where the shorter working week is becoming more general, healthy amusement and recreation are becoming increasingly important. The herd instinct which makes people congregate in cities robs them of the health-giving privilege of living in the open spaces.

It is interesting to quote from the report of the Executive Council of the American Federation of Labour, submitted in 1924—" In respect to the needs of the workers for wholesome recreation, we call attention to the fact that so much of industry which is carried on to-day within doors requires the utilization of only the small muscles for the most part and consists of minute processes, all of which means that on the job the worker gets little sunshine and fresh air, little exercise of the major muscles of the body, the lungs and heart, and that he derives meagre, if any, creative satisfaction from his hours of daily toil.

" The results of this are revealed in the mortality statistics for the so-called degenerative diseases of heart, liver, stomach, nerves and kidneys. They are altogether too high, and unnecessarily so. Workers must take more recreation during the greater leisure which they have gained through the shorter work day. Here is their great opportunity to conserve and increase their health, virility, efficiency, and at the same time to get more joy out of life. They should make use of every community facility that exists in their cities and actively aid in their extension and perfection until all the people of all ages are served thereby."

Exercise and play are almost as essential for a child's development as air, food and sleep. It has been said that " the boy who does not play is father to the man who is out of work." To the decree that " mankind shall work for his daily bread " has been added the decree that " mankind shall play for the salvation of both his body and soul," a decree so inwrought in the very constitution of men that there is no greater danger to mankind, especially in his state of childhood, than the prevention or misdirection of play.

Any child whose playground is the street, has not the opportunity of developing those healthy instincts, latent powers and self expression which gives the desire in after life to use his leisure to the best advantage. As Mrs. F. Anderson, the pioneer of Children's Playgrounds in Sydney, says—" Other countries although perhaps less interested in sport than Australia, are yet far ahead of us in their desire to give little children playgrounds." Baltimore, a maritime city, with a population less than that of Sydney, has a Playground Association controlling twenty-seven playgrounds in contrast to half a dozen in Sydney.

According to a report of the British Commission on Playgrounds—" The spectacle of the people of an industrial city like Chicago at play in the parks is a spectacle of a people working out its own salvation. For children between the ages of 10 and 12 years there are playgrounds equipped with every kind of apparatus. For smaller children there is a portion of the playground containing swings, slides, see-saws, a sand-heap shaded by trees and a wading pool. The older people can sit in the shade of the trees while the young people, both men and women, engage in basket-ball, tennis and other games. In the field house there are dancing classes, debating clubs and a library. After dark the grounds are brightly lighted.

" The study of the work of the Children's Courts in Chicago proved that the influence of a small playground was felt for half a mile around and that within that radius there was a 28 per cent. decrease in juvenile delinquency. Where facilities for play existed the number of probationers who were not again summoned to the court decreased by 44 per cent.

" In a country with wide empty spaces crying for population, it is a short-sighted policy to condemn many of the city children to play in the streets. Those children whose only playground is the street will be the largest proportion of the future citizens and will elect the legislators of Australia.

" Can wise legislation and administration be anticipated from the oncoming generation if we hunt the children from parks and gardens and rob them of their highest birthright, the wholesome play of childhood, which alone can give them the sense of give and take, justice and self-control, the sole preparation for good citizenship." The Sydney City Council is providing a playground for children in each of the thirteen wards of the city, thus giving a lead to the suburban municipalities.

It is not only for the younger children that playgrounds are necessary. There is an obvious need for more playing fields for the national games of cricket and football, as well as golf, the success of the latter as a municipal function having been demonstrated by the popularity of the City Municipal Golf Links at Moore Park.

There is also an especial need for playing areas for girls and young women. In this regard attention is directed to the opportunity of improving the environment of the Royal Alexandra Hospital for Children by resuming 7 acres at the rear of that institution and converting an area which at present is an eyesore, and by reason of its occupation by stables, a fruitful source of fly-breeding, into a park which would be a suitable recreation ground for women and children.

An appeal was previously made to athletic and sporting associations to at least consider the requirements as to playing areas to meet the prospective increase of population in the future. Years hence, when future generations enjoy more leisure for recreation, those of the present generation who neglect the opportunity of securing reserves, if not able to communicate their regret to provide open spaces, will not be able to complain if areas given up to the burial of the dead, as has been the case in older cities, are used for the benefit of the living. Town-planning authorities lay down the principle that at least a tenth of the area of a municipality should be reserved for parks and recreation.

Fortunately the present Government of New South Wales has shown its appreciation of the situation by reserving Berry Island and Ball's Head in North Sydney, Dobroyd Point in Manly, presenting Lidcombe with 44 acres, and reserving Brown's Forest at Pymble, besides giving encouragement to local authorities to purchase areas for recreation. Woollahra has not only given an excellent lead to other municipalities in providing good roads and widening New South Head Road, but also converting large areas formerly used as Chinese gardens, into a park and playing areas. The Ryde Council has also increased its park area. It is lamentable, however, to record the apathy of such municipalities as Bankstown, Bexley, Dundas, Granville, Kogarah, Mascot and Liverpool all of which have less than one per cent. of their area reserved for parks and recreation.

If an argument were needed for unifying the local government of the County of Cumberland and laying out the area on town planning lines, surely the fact that large and as yet comparatively sparsely populated areas have made inadequate provision for open spaces ahead of development is one which should appeal to people who have already the experience of the cost of resumptions in congested centres of population.

Failing the creation of a Greater Sydney, thus making one authority for a city which not only in name embraces socially and commercially one community, with streets continuous or contiguous, with one water supply, one sewerage system, practically one electric light system, and other general public utilities, at present controlled by two-score or more representative local authorities and various boards nominated or representative, there is a crying need for some co-ordinating authority which will at least make a regional plan of the area and not allow the indefinite continuance of the present topsy growth of the metropolis. My experience as district health officer, Auckland, New Zealand, from 1907–1910, made me a strenuous advocate for the amalgamation and unification of the suburban local authorities with the city.

A visit to Auckland in 1925, after fifteen years absence, during which time the population had doubled, showed the great progress that had been made in civic development following the incorporation of outlying authorities with the city.

Later experience as Chief Health Officer of Tasmania showed me that Hobart suffered from the same multiplicity of control, and that to secure advancement on satisfactory lines it was essential to secure unity of administration of the whole of the metropolis. Saving the suburbs from falling into the condition of the older portions adjoining the city by purchasing land on the periphery as playing areas in advance of population is the only rational economic way of dealing with the problem of providing adequate recreational facilities.

To those who consider that allotting one-tenth of the total area for recreation is excessive, it should be pointed out that in estimating the amount of park space required in any city or suburb the ultimate increase of population should be considered, as once any area is built over it becomes too expensive to clear and re-convert it into open land. The provision of parks and open spaces as playing fields for recreation which also act as breathing spaces in cities, is so important a factor affecting the health of the people, that each local authority should be asked to submit suggestions showing how it proposes to meet the problem of making provision for the next fifty years.

TABLE 9—Parks and Reserves.

Municipality.	Park area.			Area of Municipality.	Percentage of area.
METROPOLIS.					
	a.	r.	p.	acres.	
Sydney	647	0	34¼	3,244	19·6
Alexandria	21	1	8	1,051	2·01
Annandale	8	2	29½	346	2·4
Ashfield	32	3	19¼	2,042	1·6
Balmain	41	3	20¾	977	4·2
Bexley	14	0	0¾	1,910	0·7
Botany	74	2	28	2,163	3·1
Burwood	16	0	4	1,107	1·4
Canterbury	116	3	19½	8,256	1·4
Concord	164	0	36½	2,716	6·0
Darlington	....			54	......
Drummoyne	53	1	15	1,956	2·7
Eastwood	81	0	3	2,953	2·7
Enfield	18	0	0	1,678	1·0
Erskineville	11	2	0	186	6·2
Glebe	43	2	29¼	518	8·3
Homebush	15	0	0	595	2·5
Hunter's Hill	79	3	31½	1,415	5·6
Hurstville	132	1	33	6,165	2·1
Kogarah	19	1	39¾	4,762	0·4
Lane Cove	47	0	3	2,567	1·8
Leichhardt	40	1	12	1,155	3·4
Manly	2,254	2	38	2,800	80·5
Marrickville	54	0	37	1,889	2·8
Mascot	10	1	18¼	2,228	0·4
Mosman	268	3	24¼	2,139	12·5
Newtown	1	1	14¼	480	0·2
*North Sydney	161	3	2	2,528	6·4
Paddington	14	0	29¾	421	3·3
Petersham	24	3	14	850	2·9
Randwick	1,036	1	21¾	8,528	12·1
Redfern	11	3	23	404	2·9
Rockdale	177	0	28	5,102	3·4
METROPOLIS—*continued.*					
	a.	r.	p.	acres.	
Ryde	235	0	34¼	6,968	3·3
St. Peters	44	1	22¾	902	4·8
Strathfield	16	3	33	1,790	0·9
Vaucluse	121	3	17	796	15·3
Waterloo	8	1	9¾	827	0·9
Waverley	182	2	33¼	2,185	8·3
Willoughby	226	0	30¼	5,470	4·1
Woollahra	121	0	35½	1,885	6·4
SHIRES.					
	a.	r.	p.	sq. miles.	
†Ku-ring-gai	2,832	3	21¼	33	
Unincorporated islands in Harbour	6	0	29	6	100·0
EXTRA METROPOLITAN MUNICIPALITIES.					
	a	r.	p.	acres.	
Auburn	12	2	9	2,590	0·5
Bankstown	68	0	0	19,205	0·3
Cabramatta-Canley Vale.	3	3	0	7,830	0·04
Dundas	5	1	38	2,722	0·18
Ermington-Rydalmere	11	0	0	2,039	0·5
Fairfield	44	0	0	15,976	0·2
Granville	41	2	19	4,038	1·0
Lidcombe	69	0	32	5,274	1·3
Liverpool	39	0	0	26,195	0·14
‡Parramatta	515	0	17½	2,230	23·1
Prospect and Sherwood	49	0	0	9,621	0·4
SHIRES.					
	a.	r.	p.	sq. miles.	
§Warringah	17,091	2	35¼	103	
Hornsby	11,715	0	0	198	

§ Includes Berry Island and Balls Head.
‡ Includes Parramatta Park.

† Portion of Ku-rin-gal Chase not Included.
§ Portion of Ku-ring-gai Chase not Included.

HOUSING.

As this subject has been dealt with in previous reports, and more especially in that of 1924, it only remains to record that each year makes the problem more acute. With the exception of the City Council, no local authority has even considered a scheme of municipal housing. Again it is obvious that the only satisfactory solution of the housing problem in a rapidly progressing city like Sydney is for the population to be attracted to the outskirts instead of being crowded in the more congested central districts.

Town-planning enthusiasts hardly realise, however, that without cheap and rapid means of transport work people cannot afford to live at considerable distances from their work. Where there is not one controlling authority for the metropolitan area responsible for the housing and traffic, it is difficult to subordinate public transport to public benefit. That is one factor in which Auckland has an advantage over Sydney. In Auckland both the trams and buses are run by the City Council, which also practically controls the water supply and sewerage system; there you do not see the spectacle of one authority taking up a road which another has just laid down, and it is possible for the municipality to build houses well away from the centre of the town.

LEGAL PROCEEDINGS TAKEN BY LOCAL AUTHORITIES.

TABLE 10.—Legal proceedings taken by local authorities during the year 1925 in respect of matters affecting public health:—

Metropolis—Name of Municipalities.	Public Health Acts.	Noxious Trades Act.	Local Government Ordinances.	Convictions obtained.	Cases dismissed.	Cases withdrawn.	Total cases.
Alexandria	2	1	12	14	1	...	15
Balmain	3	...	7	10	...	...	10
Bexley	...	3	...	3	...	...	3
Burwood	1	...	3	3	...	1	4
Canterbury	...	...	1	1	...	...	1
Darlington	...	...	1	1	...	...	1
Enfield	...	...	1	1	...	...	1
Glebe	...	...	3	1	1	1	3
Hunter's Hill	...	...	3	2	...	1	3
Hurstville	1	...	...	1	...	...	1
Kogarah	...	...	2	2	...	...	2
Lane Cove	1	...	5	2	...	4	6
Leichhardt	...	...	3	3	...	...	3
Manly	...	...	9	6	1	2	9
Mosman	...	...	3	2	1	...	3
Mascot	...	...	1	1	...	...	1
North Sydney	8	...	16	13	...	11	24
Paddington	...	...	4	4	...	...	4
Randwick	...	...	6	6	...	...	6
Redfern	...	...	3	3	...	...	3
Rockdale	...	...	2	2	...	...	2
Ryde	...	...	2	2	...	...	2
Waterloo	4	1	1	6	...	...	6
Waverley	...	...	8	8	...	...	8
Willoughby	...	...	2	1	...	1	2
Woollahra	...	...	4	3	...	1	4
Ku-ring-gai Shire	1	1	10	12	...	...	12
EXTRA METROPOLITAN.							
Hornsby Shire	...	...	3	3	...	...	3
Parramatta	...	...	2	1	1	...	2
Prospect and Sherwood	...	...	2	2	...	...	2
Warringah Shire	...	...	3	3	...	...	3
Totals	21	6	122	122	5	22	149

INSPECTION OF RESTAURANTS, TEA-ROOMS, BUTCHERS' SHOPS, MILK VENDORS, LODGINGHOUSES, BARBERS' SHOPS, &C., IN THE CITY.

In connection with the general administration of the City Health Officer's Department, it may be stated that there are 21,109 premises, 241 restaurants, 217 tea-rooms, 950 milk vendors, 85 fruit shops, 65 fish shops, 101 butchers' shops in the City.

The following is a summary of the routine work during the year:—

No.	(1) Number of complaints received and dealt with	1,073
,,	(2) Streets, house-to-house inspection work, lanes, re-inspections, restaurants, and garbage receptacles	38,236
,,	(3) Inspection of butcheries, meat depôts, poulterers, produce stores, &c., stores, &c.	5,949
,,	(4) Inspections made under the Pure Foods Regulations	10,896
,,	(5) ,, of common lodging-houses	90
,,	(6) ,, by lady inspector	902
,,	(7) Number of premises visited by rat-catcher's staff	13,151
,,	(8) Investigations of infectious diseases	244
,,	(9) Inspections under the Dairies Supervision Act	2,293
,,	(10) Disinfection of premises	215
,,	(11) Investigation of smoke nuisances	134
,,	(12) Notices served under the provisions of the Public Health Act	1,042
,,	(13) Number of premises referred to the City Building Surveyor	647
,,	(14) ,, milk vendors registered	1,185
,,	(15) ,, ,, samples taken for analysis	1,000
,,	(16) ,, rats caught	5,136
,,	(17) Prosecutions against offenders	379
,,	(18) Uncovered garbage receptacles (prosecutions)	148
,,	(19) Total amount of fines and costs inflicted	£581 0s. 6d.

LEGAL PROCEEDINGS, SYDNEY MUNICIPAL COUNCIL.

The following is a record for the year 1925 with regard to legal proceedings taken by the Sydney Municipal Council:—Sydney Corporation Act and by-laws, 308; Public Health Act, 4; Pure Food Act, 49; Police Offences Act, 11; Dairies Supervision Act, 4; Sydney Electric Light Act, 3.

225 notices were served in the City proper under the Pure Food Act; 777 plans were inspected and reports made thereon by the City Health Officer's staff.

In all there were 4,639 notices served in the City under the Sydney Corporation Act, the Public Health Act, the Pure Food Act, the Dairies Supervision Act, and the Noxious Trades Act.

Of the thousand samples of milk taken in the City, ten were found not in conformity with the standard. There were two convictions for selling milk deficient in milk-fat.

I am, &c.,

J. S. PURDY,

Metropolitan Medical Officer of Health.

TABLE 12.—Principal Causes of Death in

Causes of Death.	Age Periods—Metropolis.											(In Sub-Districts of																					
	Under 1 year.	1—4 years.	5—14 years.	15—24 years.	25—34 years.	35—44 years.	45—54 years.	55—64 years.	Over 65 years.	Age not stated.	Total.	Sydney.	Alexandria.	Annandale.	Ashfield.	Balmain.	Bexley.	Botany.	Burwood.	Canterbury.	Concord.	Darlington.	Drummoyne.	Eastwood.	Enfield.	Erskineville.	Glebe.	Homebush.	Hunter's Hill.	Hurstville.	Kogarah.	Lane Cove.	Leichhardt.
Typhoid Fever	...	1	2	6	9	8	3	1	...	...	30	1	1	...	1	2	...	2	1	1	...	...	...	...	...	...	...	...	1	...	1	1	...
Measles	1	8	2	...	...	...	...	...	...	...	11	2	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...
Scarlet Fever	2	4	3	...	2	2	...	...	...	...	13	1	...	...	...	...	...	...	...	2	1	...	...	...	...	...	...	1	...	1	1	...	1
Whooping Cough	68	35	6	...	...	1	...	...	...	...	110	13	6	2	...	5	...	4	1	3	...	1	2	1	3	2	5	...	1	1	3	1	1
Diphtheria	10	39	5	...	...	1	...	...	...	...	55	8	2	...	1	2	...	2	...	6	...	...	...	...	1	...	2	...	...	...	2	2	1
Influenza with Pulmonary Complications.	2	...	2	1	1	6	3	1	5	...	21	5	...	...	2	2	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...
Influenza—other	6	6	2	1	2	2	5	1	5	...	30	3	...	...	2	...	...	...	...	...	1	...	1	...	...	...	1	1	1	2	...	...	...
Erysipelas	4	1	2	1	1	1	1	1	2	...	14	...	...	...	...	1	...	...	...	3	...	...	...	...	...	...	...	...	1	...	...	...	1
Infantile Paralysis	...	...	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lethargic Encephalitis	...	1	...	1	1	3	3	5	...	...	14	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
Epidemic Cerebro-Spinal Meningitis.	2	2	3	...	1	...	...	...	...	...	8	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1	1	...	...
Other Epidemic Diseases	3	5	3	...	1	1	2	1	5	...	21	1	...	...	1	...	...	...	...	2	...	...	1	...	...	3	...	...	2	...	...	...	1
Tuberculosis of Respiratory System.	1	1	4	56	127	102	84	79	28	...	482	121	3	12	14	8	5	2	9	18	5	3	5	1	2	1	14	1	1	6	12	3	12
Tuberculosis—Meninges, &c.	1	12	7	3	1	...	1	...	1	...	26	2	...	...	...	1	...	...	2	4	...	...	...	...	...	...	1	...	...	2	...	...	5
Other Tubercular Diseases	2	4	3	9	9	6	2	5	3	...	43	4	...	...	2	1	...	...	...	2	2	...	...	...	...	...	2	...	2	1	1	1	2
Cancer	...	7	5	9	18	83	204	315	458	...	1,099	167	9	15	48	43	15	8	20	46	10	3	19	2	10	5	27	3	13	21	20	8	22
Diabetes	...	1	2	2	8	9	17	35	56	...	130	10	...	1	5	3	2	3	2	4	...	...	1	...	1	1	2	1	1	6	6	...	4
Other General Diseases	30	17	36	22	24	53	56	55	63	...	356	41	1	8	8	11	5	2	6	10	5	3	5	3	5	1	10	3	4	8	5	3	18
Meningitis	12	9	12	4	7	7	4	5	3	...	63	6	...	1	2	3	1	1	...	2	2	...	2	...	3	...	2	...	...	1	1	...	4
Cerebral Hæmorrhage	...	...	...	2	6	20	60	99	261	...	448	65	2	8	29	15	7	2	12	15	5	2	14	3	4	5	11	1	5	3	9	3	9
Convulsions of Infants	12	3	...	...	...	...	...	...	...	...	15	2	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...	...	1	...	2
Other Diseases of Nervous System.	1	5	15	13	29	54	84	79	99	...	379	42	6	2	12	12	5	2	6	11	4	2	6	2	3	...	5	...	17	6	5	2	15
Diseases of Heart	...	8	16	24	52	96	161	306	819	...	1,482	227	14	10	64	48	29	3	30	43	15	1	32	7	17	13	34	4	7	23	24	12	59
Other Diseases of Circulatory System.	...	...	2	1	4	11	35	75	158	...	286	49	3	6	9	8	3	...	3	6	4	...	1	...	...	...	2	1	3	5	9	5	1
Bronchitis	18	3	...	2	5	3	8	16	134	...	189	23	2	2	13	4	2	2	5	10	...	...	4	2	3	2	2	...	4	2	2	1	12
Pneumonia	132	76	12	19	42	67	56	86	207	...	697	100	14	11	32	39	6	5	10	20	8	4	13	2	9	5	19	2	1	17	14	5	17
Other Diseases of Respiratory System.	3	4	3	4	10	15	10	24	46	...	119	13	...	...	4	1	3	2	4	2	2	4	8	...	2	3	2	1	2	1	2	...	2
Diseases of Stomach	5	1	...	...	7	6	17	9	19	...	64	10	...	1	3	5	1	2	1	1	1	...	1	1	...	...	1	...	1	1	...	...	3
Diarrhœa and Enteritis	191	45	...	1	1	3	7	5	23	...	276	17	9	3	13	18	7	5	4	13	4	...	7	1	3	10	8	1	1	5	4	1	9
Appendicitis	...	3	10	8	8	13	13	9	7	...	71	9	1	...	...	2	1	...	1	1	...	...	...	...	1	...	1	...	1	...	3	1	2
Hernia-Intestinal Obstruction	9	3	5	1	3	9	16	11	37	...	94	9	3	1	5	5	1	...	1	5	1	...	3	...	1	...	1	1	1	2	3	1	2
Cirrhosis of Liver	...	...	...	...	1	5	10	12	12	...	40	11	...	...	3	1	...	...	1	...	1	...	...	...	...	1	...	...	...	1	...	...	...
Peritonitis	2	...	1	1	3	9	3	5	2	...	26	4	...	...	3	3	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...
Other Diseases of Digestive System.	2	3	1	2	13	12	15	26	41	...	115	14	1	2	4	5	...	...	2	1	2	...	3	1	...	1	2	...	...	2	3	1	3
Bright's Disease, Acute and Chronic.	...	4	4	12	33	55	88	127	229	...	552	63	...	7	19	38	14	3	8	11	8	3	8	2	3	1	14	4	1	17	26	9	14
Other Genito-Urinary Diseases	2	1	1	5	13	17	19	36	71	...	165	20	3	2	10	6	1	1	4	4	2	...	2	1	2	1	6	...	...	4	3	1	3
Puerperal Septicæmia	...	...	...	12	15	4	...	...	...	...	31	5	...	2	...	...	1	...	1	...	1	...	2	...	2	1	1	...	...	...	1	...	2
Other Puerperal Diseases	...	...	...	19	46	48	1	...	...	...	114	10	1	...	3	5	2	3	2	3	3	...	2	...	1	2	4	1	1	...	2	2	...
Prematurity	354	...	...	...	...	...	...	...	...	...	354	57	4	6	8	20	1	1	7	18	5	1	7	1	3	5	4	1	3	4	9	2	8
Other Developmental Diseases of Infants.	282	3	...	...	...	...	...	...	...	...	285	36	3	3	12	12	2	3	7	15	3	...	12	1	6	1	6	1	3	3	5	...	8
Senility	...	...	...	...	...	...	...	7	391	...	398	89	3	5	11	8	1	...	18	14	8	...	4	...	5	1	16	3	4	1	8	2	6
Suicide	...	...	...	7	28	26	18	18	13	1	111	32	1	2	1	7	1	...	1	4	1	...	1	...	1	...	...	...	...	...	2	...	2
Accident	11	42	50	30	33	59	42	40	69	...	376	85	2	7	11	14	1	4	4	12	6	...	5	1	3	3	10	3	...	8	10	3	12
All other Causes	18	6	15	9	16	18	22	33	33	2	172	40	2	2	3	6	1	1	1	7	...	2	2	...	2	1	7	3	8	2	2	2	9
Totals	1,186	363	235	287	580	835	1,070	1,527	3,300	3	9,386	1,418	96	121	360	364	118	63	174	322	110	29	177	32	96	70	224	38	90	159	200	72	273
Deaths under 1 year	...	...	...	...	...	...	...	...	...	...	1,186	139	27	16	40	71	10	9	22	57	15	4	33	5	19	21	23	7	10	15	23	4	34

each Municipality and in Age Groups, year 1925.

Metropolis at all Ages.)																				Extra Metropolitan Municipalities.											Shires.			
Manly.	Marrickville.	Mascot.	Mosman.	Newtown.	North Sydney.	Paddington.	Petersham.	Randwick.	Redfern.	Rockdale.	Ryde.	St. Peters.	Strathfield.	Vaucluse.	Waterloo.	Waverley.	Willoughby.	Woollahra.	Shire of Kuring-gai	Auburn.	Bankstown.	Cabramatta and Canley Vale.	Dundas.	Ermington and Rydalmere.	Fairfield.	Granville.	Ingleburn.	Lidcombe.	Liverpool.	Parramatta.	Prospect and Sherwood.	Hornsby Shire.	Warringah Shire.	Causes of Death.
...	6	...	2	...	3	1	1	1	2	1	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	Typhoid Fever.
...	1	...	...	...	...	...	...	1	...	...	1	...	...	...	1	1	1	...	1	...	1	...	...	...	...	1	...	...	...	2	...	...	...	Measles.
...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Scarlet Fever.
5	5	2	...	5	2	5	...	2	7	5	5	3	...	...	1	2	...	6	...	2	1	...	...	...	1	...	...	1	...	2	...	3	2	Whooping Cough.
...	...	1	...	2	4	1	3	...	3	1	1	2	...	...	...	2	4	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Diphtheria.
...	2	...	1	...	1	...	...	1	...	1	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Influenza with Pulmonary Complications.
1	1	...	2	1	1	1	1	2	...	2	1	...	...	...	...	2	1	1	1	...	...	...	1	...	...	...	...	2	...	3	1	3	...	Influenza—other.
...	...	...	1	2	2	...	...	...	1	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Erysipelas.
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	Infantile Paralysis.
...	1	...	1	2	1	...	...	1	...	...	1	...	...	...	...	...	...	2	1	...	...	...	...		...	...	...	...	...	1	...	...	...	Lethardic Encephalitis.
...	...	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...		...	...	...	Epidemic Cerebro-Spinal Meningitis.
1	1	...	...	...	1	1	1	...	1	1	1	...	...	...	...	...	2	...	...	...	...	...	1	3	...	1	...	1	...	...	...	...	...	Other Epidemic Diseases.'
7	16	1	2	19	20	16	12	23	12	8	9	9	3	...	10	14	18	9	16	9	8	1	...	10	2	3	1	48	3	12	2	27	3	Tuberculosis of Respiratory System.
...	2	...	...	1	1	1	...	2	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	Tuberculosis—Meninges, &c.
1	4	...	...	2	1	2	2	3	...	1	...	...	...	...	2	3	1	...	1	2	...	...	...	3	...	...	...	...	...	1	...	...	...	Other Tubercular Diseases.
21	34	13	32	35	57	39	24	78	21	32	14	7	10	5	12	40	30	32	29	15	7	4	1	2	6	8	...	31	35	18	3	15	7	Cancer.
5	6	3	2	3	8	5	1	10	4	6	...	1	2	1	2	4	4	3	7	4	2	...	...	1	1	1	...	4	2	4	3	1	1	Diabetes.
8	21	4	8	8	19	14	8	17	11	6	8	3	7	1	5	17	7	13	6	6	2	...	...	1	2	2	2	12	5	6	3	3	...	Other General Diseases.
...	1	...	2	2	1	...	3	6	3	...	2	3	...	1	3	...	3	...	2	2	1	...	...	...	...	1	...	...	...	2	...	...	...	Meningitis.
10	21	1	6	15	17	15	20	10	14	13	5	2	4	3	4	19	16	14	10	3	2	...	...	5	1	3	...	31	7	9	2	5	5	Cerebral Hæmorrhage.
...	...	...	1	...	...	...	2	...	...	...	...	...	2	...	...	...	...	1	1	1	1	...	...	...	...	...	...	...	...	1	...	...	...	Convulsions of Infants.
10	17	4	11	14	20	13	12	25	15	9	9	6	3	...	1	21	6	11	7	4	3	...	...	16	...	7	...	39	5	13	2	3	...	Other Diseases of Nervous System.
35	80	13	38	29	73	48	41	79	39	31	23	24	22	4	18	67	32	30	40	14	15	4	1	36	11	28	...	76	16	36	14	23	15	Diseases of Heart.
7	16	2	10	11	10	7	14	17	9	7	3	2	4	1	5	12	12	15	4	3	2	1	...	18	2	...	...	12	1	10	3	7	1	Other Diseases of Circulatory System.
1	9	...	7	8	6	2	2	6	5	10	2	2	2	...	2	13	6	6	3	...	2	...	1	4	2	1	...	22	1	2	2	3	3	Bronchitis.
9	24	10	11	23	26	28	21	30	34	19	9	10	8	1	13	24	20	11	13	12	5	1	...	4	7	6	1	18	4	10	4	10	1	Pneumonia.
2	6	...	7	6	7	5	3	3	...	2	...	...	1	1	2	7	4	3	2	4	1	...	1	...	1	1	...	16	...	1	1	3	1	Other Diseases of Respiratory System.
2	1	1	1	...	3	1	4	5	1	1	...	...	1	1	...	5	1	1	2	1	1	...	...	1	...	...	...	3	1	...	...	...	...	Diseases of Stomach.
9	8	2	3	7	13	11	9	6	12	9	5	8	2	1	4	6	11	4	3	6	2	...	...	4	...	6	...	14	2	5	1	4	3	Diarrhœa and Enteritis.
3	4	2	3	1	4	1	3	6	1	3	2	...	1	...	1	4	2	2	4	3	...	...	...	...	...	1	...	1	...	3	1	1	...	Appendicitis.
...	6	2	3	4	6	2	3	4	1	...	2	1	2	...	2	4	3	1	2	3	...	...	...	1	...	4	...	3	...	3	1	...	...	Hernia-Intestinal Obstruction.
1	1	...	...	...	3	2	2	5	...	...	1	...	...	...	...	2	1	2	1	...	...	...	...	...	...	...	...	4	1	...	...	1	...	Cirrhosis of Liver.
1	1	..	...	2	1	2	...	1	...	...	1	...	...	...	...	...	...	2	2	...	...	...	...	...	...	...	...	1	...	1	...	...	...	Peritonitis.
1	3	...	3	5	9	5	5	6	...	1	5	3	...	3	1	6	2	6	4	2	...	1	...	4	...	1	...	3	1	3	...	1	...	Other Diseases of Digestive System.
10	24	6	12	15	24	14	17	35	15	16	4	10	6	3	10	24	13	15	6	4	4	...	...	9	...	6	...	23	6	19	5	5	3	Bright's Disease, Acute and Chronic.
6	4	3	4	6	8	6	7	12	9	...	...	...	1	...	5	7	1	6	4	3	1	...	...	1	1	...	...	19	2	[illegible]	...	...	...	Other Genito-Urinary Diseases.
1	1	...	...	1	1	1	...	1	...	1	...	...	...	...	1	2	2	...	...	2	...	...	...	...	...	...	...	...	...	..	...	...	...	Puerperal Septicæmia.
3	9	2	2	8	5	4	2	4	1	4	1	4	...	1	2	3	6	3	3	3	...	1	...	...	...	...	...	...	...	1	...	...	...	Other Puerperal Diseases.
3	12	5	5	6	19	36	7	12	5	19	4	6	1	1	4	13	15	3	3	9	2	1	...	...	1	3	...	9	...	7	5	3	4	Prematurity.
8	11	3	3	7	11	27	2	14	4	9	6	1	2	...	3	12	14	3	3	...	6	1	2	1	1	3	...	1	4	10	4	4	2	Other Developmental Diseases of Infants.
10	12	4	3	16	26	13	10	14	10	3	1	3	5	3	8	16	13	16	5	8	8	4	2	...	3	7	...	113	12	[illegible]	1	5	2	Senility.
4	1	1	1	3	3	9	2	9	...	3	2	1	...	5	1	3	2	3	2	1	...	...	...	...	1	...	...	3	1	2	1	1	1	Suicide.
6	12	3	5	14	13	14	7	17	12	11	11	2	1	...	6	15	12	8	3	6	6	...	1	...	1	3	...	6	7	19	...	7	6	Accident.
3	5	1	3	3	4	5	1	8	5	3	6	2	...	...	1	8	4	5	2	...	2	1	1	1	...	1	1	8	3	2	...	2	1	All other Causes.
194	390	90	196	286	434	357	252	478	257	238	145	115	90	36	130	382	274	240	196	133	85	20	12	125	44	98	5	525	119	220	59	140	61	Totals.
19	40	14	13	30	44	96	27	36	33	48	16	22	8	2	14	43	46	17	14	18	19	3	1	1	10	12	...	11	6	25	11	15	9	Deaths under 1 year.

Deaths Extra Metropolitan Municipalities under 1 year, 141.

All deaths of inmates of institutions, formerly resident within the Metropolitan Combined Sanitary Districts, have been corrected to the proper municipality.

2.—Hunter River Combined Sanitary District.

Staff.

H. G. Wallace, M.B., B.S., D.P.H. (Melb.), Medical Officer of Health.
George H. Godfrey, Assoc. Roy. San. Inst. (Lond.), Senior Sanitary Inspector.
Nancy B. McKay, Cert. Roy. San. Inst. (Lond.), Nurse Inspector.
Beatrice M. Durie, Clerk.

REPORT OF THE MEDICAL OFFICER OF HEALTH FOR THE YEAR 1925.

Dear Sir,

I have the honour to submit the following report of the Public Health work done in this district during the year 1925.

Description.—The Hunter River Combined Sanitary District consists of seventeen (17) municipalities and five (5) shires, together with the harbour of Port Hunter. The total area of the district, exclusive of Port Hunter, is 1,768 square miles. The distance from Newcastle of outlying parts of the district varies up to 70 miles. From time to time, on instruction from the Head Office, Sydney, duties are carried out in areas beyond the boundaries of the district.

Population.—The estimated mean population of the district in 1925 was 186,790, an increase of 5,800 over the mean population in 1924. The population is chiefly engaged in industrial, coal-mining, and pastoral occupations.

Administration.—The staff of the District Headquarters at Newcastle consists of a Medical Officer of Health, a Senior Sanitary Inspector, a Nurse Inspector, and a clerk. Miss Doris Bate, who had acted as clerk for ten years past, resigned during the year. Her place was filled by the appointment of Miss B. M. Durie from Head Office Staff. Each municipal and shire council in the district is a local health authority, and has its own health inspector. Many of these officers have had little or no special training in health work, and, moreover, a number of them, in addition to their duties as health inspectors, act as town clerk, engineer, working foreman, traffic inspector, &c. In consequence some health activities, notably housing inspections and inspections under the Pure Food Act, are liable to be overshadowed by other duties, and part, at least, of this work falls on officers of the Department of Public Health.

Vital Statistics.—The population figures for each municipality and shire, together with the chief causes of death at all ages, and of infants under one year of age, are set out in the tables appended to this report. The total births numbered 5,319, giving a crude birth-rate of 28·4, compared with 24·0 for the whole State. The deaths from all causes numbered 1,633, giving a death-rate of 8·7, compared with 9·15 for the whole State.

Infectious Diseases.—The following tables show the distribution of the notifiable infectious diseases in the district during 1925.

Typhoid Fever.

A new low record in the incidence of typhoid fever was established during the year. This disease has shown a steady decline since the introduction of a sewerage system in the suburbs, which is being extended each year. Improved sanitary services throughout the district are, no doubt, also a contributing factor. The method of prophylactic vaccination with a typhoid-paratyphoid vaccine was made use of in several cases, but multiple cases in one house are uncommon, and it is questionable whether this procedure is often necessary.

Table I.—Showing distribution of cases of typhoid fever in the Hunter River Combined Sanitary District the number treated in hospital, and the attack and death rates per thousand of the population during the year 1925.

District.	Estimated Population.	Cases notified.	Removed to Hospital.	Attack-rate per 1,000.	Death-rate per 1,000.
Municipalities—					
Adamstown	4,460	......	......	......	......
Carrington	3,140	1	1	·31	......
Greta	1,580	......	......	......	......
Hamilton	16,700	4	4	·24	......
Lambton	4,030	2	2	·49	·24
Maitland East	3,830	4	2	1·04	......
Maitland West	8,830	2	2	·22	·22
Merewether	7,380	6	6	·81	......
Morpeth	1,070	5	4	4·67	......
Newcastle	15,240	2	2	·13	·06
New Lambton	4,750	......	......	......	......
Raymond Terrace	860	......	......	......	......
Singleton	3,270	4	4	1 22	......
Stockton	5,270	3	2	·56	......
Wallsend	7,100	3	3	·42	·28
Waratah	14,900	8	6	·53	......
Wickham	13 430	1	1	·07	......
Shires—					
Bolwarra	3,290	1	1	·30	......
Cessnock	35,410	1	1	·03	......
Lake Macquarie	22,570	6	5	·26	......
Port Stephens	3,820	......	......	......	......
Tarro	5,860	......	......	......	......
Total	186,790	53	46	·28	·02

Of the 53 cases of typhoid fever notified, 46 were treated in hospital. Months of greatest incidence were January, February, March, April, November, and December. Incidence rate per 1,000 of population ·28, the lowest on record for the district. Notifications for previous five years:—1920, 21; 1921, 133; 1922, 81; 1923, 112; 1924, 79. Average, 99.

House Incidence.—In 48 cases there was only one patient from each house; in one instance there were 2 cases; and in another, 3 cases from the same house.

Age Incidence.—Of the 53 persons attacked the ages were as under:—1–4, 1; 5–14, 11; 15–24, 21; 25–34, 8; 35–44, 8; 45–54, 4. Total, 53.

Deaths from Typhoid.—There were five deaths from typhoid fever during 1925, giving a death-rate of 0·02 per 1,000 of population, compared with 0·04 for the whole State. The highest incidence was in Morpeth, Singleton, and Waratah Municipalities, and Lake Macquarie Shire.

DIPHTHERIA.

293 cases of diphtheria with 14 deaths were notified, the lowest number since 1919. The disease, however, is widely distributed throughout the district, only three small municipalities having remained free. 405 cases were notified in 1924. For the previous five years there was an average of 396 cases. Cases notified equalled 1·50 per thousand of the total population of the district. The fatality rate was 4·7 per cent. The death-rate per 1,000 of population was 0·07, compared with 0·05 for the whole State.

House Incidence.—265 houses had one case each; 11 had two cases each, and two had three cases each. Of the total attacked, 121 (41 per cent.) attended schools, whilst 42 per cent. were under 5 years of age. 87 per cent. of the cases notified were removed to hospital for treatment.

Schick Test.—The most hopeful method of combating the disease appears to be by general use of toxin-antitoxin injections, but a great deal of popular prejudice remains to be overcome before this method can be adopted on a large scale. 32 children at Cessnock were immunized by toxin-antitoxin. The material was supplied free by the Department, and the inoculations were performed by the family doctor. The Schick test was applied to 80 school children at Tea Gardens, just outside the district, with the assistance of the local medical practitioner.

TABLE 2.—Showing distribution cases of diphtheria occurring in the Hunter River Combined Sanitary District, number treated in hospital, and attack and death rates per 1,000 of the population during 1925.

District.	Estimated Population.	Cases notified.	Removed to Hospital.	Attack-rate per 1,000.	Death-rate per 1,000.
Municipalities—					
Adamstown	4,460	16	16	3·58	......
Carrington	3,140	2	2	·63	......
Greta	1,580	......	......	......	......
Hamilton	16,700	30	28	1·79	......
Lambton	4,030	4	3	·99	......
Maitland East	3,830	6	6	1·54	......
Maitland West	8,830	12	9	1·35	·45
Merewether	7,380	15	14	2·03	......
Morpeth	1,070	4	4	3·73	......
Newcastle	15,240	20	18	1·31	·19
New Lambton	4,750	15	13	3·16	......
Raymond Terrace	860	......	......	......	......
Singleton	3,270	......	......	......	......
Stockton	5,270	11	5	2 08	......
Wallsend	7,100	2	1	·28	·70
Waratah	14,900	16	13	1·07	......
Wickham	13,430	10	10	·74	......
Shires—					
Bolwarra	3,290	4	2	1·21	......
Cessnock	35,410	81	72	2·28	......
Lake Macquarie	22,570	35	31	1·55	·04
Port Stephens	3,820	2	2	·52	......
Tarro	5,860	8	8	1·36	·17
Total	186,790	293	257	1·56	·07

SCARLET FEVER.

2 5 cases of scarlet fever were notified, showing an increase of 37 per cent. over the average (171) for the preceding five years. The disease was, on the whole, mild in type. A comparatively small number of cases (60) were admitted to hospital, largely owing to lack of adequate accommodation for cases of infectious disease. Cases notified equalled 1·25 per 1,000 of the population and were notified from every district except Greta. There were two deaths, giving a fatality rate of ·88 per cent. Both fatal cases were in young children who had not been sent to hospital. The death-rate (0·01 per 1,000) was the same as that for the whole State.

House and School Incidence.—In 207 cases there was only one patient per house, and in 4 cases two patients from the same house; 70 per cent. of the notified cases were of children attending school.

Milk Supply.—There was no reason to suspect that the milk supply was in any way responsible for spread of the disease.

Table 3.—Showing distribution of cases of Scarlet Fever in the Hunter River Combined Sanitary District, the number treated in hospital, and attack and death rates per 1,000 of the population during the year 1925.

District.	Estimated Population.	Cases notified.	Removed to Hospital.	Attack-rate per 1,000.	Death-rate per 1,000.
Municipalities—					
Adamstown	4,460	12	......	2·69	......
Carrington	3,140	3	......	·95	......
Greta	1,580	......	......	......	......
Hamilton	16,700	16	1	·95	......
Lambton	4,030	5	1	1·24	......
Maitland East	3,830	1	......	·27	......
Maitland West	8,830	13	7	1·47	......
Merewether	7,380	4	2	·54	......
Morpeth	1,070	4	4	3·73	......
Newcastle	15,240	11	4	·72	......
New Lambton	4,750	10	1	2·10	......
Raymond Terrace	860	1	......	1·16	......
Singleton	3,270	1	......	·30	......
Stockton	5,270	10	1	1·89	......
Wallsend	7,100	6	2	·84	......
Waratah	14,900	24	4	1·61	......
Wickham	13,430	8	2	·59	......
Port Hunter Harbour	......	1	......	......	......
Shires—					
Bolwarra	3,290	7	......	2·12	......
Cessnock	35,410	62	18	1·74	·02
Lake Macquarie	22,570	24	6	1·06	·04
Port Stephens	3,820	4	......	1·04	......
Tarro	5,860	8	7	1·36	......
Total	186,790	235	60	1·25	·01

INFANTILE PARALYSIS.

During the year three cases of infantile paralysis were recorded, two being in Cessnock Shire and one in Lake Macquarie Shire. There were no deaths from this disease. The death-rate per thousand for the whole State was 0·002.

CEREBRO-SPINAL MENINGITIS.

Two cases of cerebro-spinal meningitis were notified, one from Tarro Shire in January and one from Waratah Municipality in March. Both cases proved fatal. The death-rate per thousand of population was 0·01, being the same as that for the whole State.

PULMONARY TUBERCULOSIS.

Sixty-one cases of pulmonary tuberculosis were notified during 1925, compared with 60 in 1924, and 69, the average for the preceding five years. There were 48 deaths. A number of cases referred to me by medical practitioners in the district were examined and arrangements made for admission to Sanatoria

Newcastle Throat and Chest Dispensary.—This work was carried on by Dr. May Harris, Nurse-Inspector McKay attending at each session to assist the medical officer. Sputum examinations are made by the Medical Officer of Health and X-ray examinations by the Newcastle Hospital staff.

A most important feature in the control of tuberculosis is recognition of the disease in its earliest manifestations. An endeavour is made to induce close contacts of cases visited by the nurse-inspector to attend at the dispensary periodically for examination. Persons from the suburbs can do this, but those in country towns find it difficult to attend. It would be an advantage if arrangements could be made for country hospitals to provide facilities for the necessary examination of suspected cases; Maitland, Cessnock, and Kurri Kurri public hospitals are equipped with X-ray plants, and should be able to undertake this work.

ANTHRAX.

One case of anthrax was brought under my notice during 1925. The patient was a miner from Greta who developed a painful swelling on the right side of the jaw, twenty-four hours after using a new shaving brush. Two days later a pustule developed; after an illness of about a fortnight's duration the patient recovered. No serum was used, nor was the sore excised. The shaving brush was examined in the Microbiological Laboratory and showed the presence of *B. anthracis*. A similar brush was seized and forwarded for examination, but the registered mail bag containing the parcel was stolen in transit. The origin of the brush could not be traced.

PLAGUE.

The trapping of rats along the water-front was continued by a rat-catcher temporarily employed by the Department; 2,073 rats were trapped by him; in addition 1,049 rats were taken to the depôt of the Newcastle City Council, which continues to pay a bonus of 6d. for each rat brought in. The majority of these were examined for signs of plague infection, but none were found to be infected. The Navigation Department continues to lay poisoned baits along the wharves. From 28th February, 1925, to 30th March, 1926, 16,510 baits were laid, of which 4,140 were taken, presumably by rats.

The occurrence in Brisbane of a case of suspected bubonic plague early in June led to some activity on the part of local councils in adopting measures directed against the rat. Men were detailed for the work of laying poisoned baits in the municipalities bordering the harbour, and a large number of rats were brought in for examination. The Railway Department and the Walsh Island Dockyard also continued an anti-rat campaign for several weeks. One rat examined showed a pleural effusion, and smears from the spleen showed large numbers of short bi-polar staining gram-negative bacilli, somewhat larger than the *B. pestis*. Cultures showed the same bacillus, but animal inoculations proved it to be non-pathogenic, and further tests excluded the possibility of its being the plague bacillus.

HOUSING.

The housing problem remained acute. In 1925 in Newcastle and suburbs 1,453 dwelling-houses were erected, and 1,613 in the remainder of the district. A number of inspections were made at the request of various local authorities and wherever houses were found to be below a reasonable standard of habitability a closing order was applied. Wherever possible, improvements necessary to render the premises habitable were recommended, and were in most cases satisfactorily carried out. Low-lying areas at Wickham, on which numbers of small, weatherboard cottages are erected, present a difficult problem with regard to adequate drainage, some becoming almost inaccessible in wet weather, while stagnant water lies in the vicinity for considerable periods. A comprehensive scheme of reclamation involving resumption and demolition of a number of the houses, and the filling-in of the site to a level above the reach of flood waters, seems to be the only possible means of rendering the area satisfactory.

Permissive occupancies of Crown land in the vicinity of cities is another subject requiring attention. In certain Newcastle suburbs some of the worst examples of housing are to be found on areas of Crown land for which permissive occupancies have been granted. A ground rent is paid, but as there is no security of tenure the tenant will not ere t an expensive dwelling, and wretched shacks made of broken packing cases and kerosene tins have been erected. In some cases these dwellings have been occupied for a considerable number of years. The councils have power to prevent the erection of buildings not in conformity with the building ordinances, but considerable latitude has been allowed to poor persons. To close these dwellings and evict the tenants would probably mean serious overcrowding elsewhere. A repetition of the conditions can be prevented by councils exercising a stricter supervision of building applications and by opposing the granting of permissive occupancies in thickly populated areas.

NEW SOUTH WALES TOWN PLANNING ASSOCIATION.

The Newcastle Branch was re-formed, and a number of members of the parent association in Sydney visited Newcastle towards the end of the year.

INFANTILE MORTALITY.

The total births numbered 5,319 and deaths of children under one year of age 307. These figures show the infantile mortality rate to be 57·7 per thousand births, compared with 66·2, the rate for this district in 1924, and 54·9 for the State of New South Wales (1925). There were 43 deaths from diarrhœa and enteritis in children under one year of age, giving a rate of 8·1 per thousand births compared with 18·4 in 1924.

A visit by Sir F. Truby King helped to arouse some local interest in child welfare, and a public lecture given by him was well attended.

MATERNAL MORTALITY.

The number of deaths from causes connected with childbirth in 1925 was 31, giving a death-rate in childbirth of 5·8 per 1,000 births, compared with 6·7 for 1923 and 5·95 for the whole State (1925). The establishment of more maternity wards at the public hospitals, and the provision of ante-natal clinics in connection with these institutions is a pressing need.

PRIVATE HOSPITALS.

At intervals throughout the year inspections were made of the 45 private hospitals in the district; Most of these premises are very satisfactory, but more attention should be paid to the keeping of the register of patients. The total number of beds in private hospitals in the district is now 287, of which 134 are in hospitals licensed to receive maternity cases only, and 153 in hospitals licensed to receive medical and surgical cases as well. On receipt of instructions from Head Office, the premises of all new applicants for licenses under the Private Hospitals Act were inspected and reported on.

PURE FOOD ACT.

During the year a total of 153 inspections of small shops was made by Nurse-Inspector McKay. Inspector Godfrey also made several inspections in connection with complaints regarding deteriorated food.

Need for Services of a Whole-time Food Inspector.—Sufficient attention to the inspection of food is not yet given by local authorities, nor can it be so long as the health inspectors of local councils continue to be over-burdened with other duties. It has been repeatedly pointed out in previous reports that there is a great need in this district for the services of a whole-time inspector under the Pure Food Act.

NOXIOUS TRADES ACT.

72 premises licensed under the Noxious Trades Act were inspected, many on several occasions. On the whole they were found to be satisfactory, though in several cases improvements were required, which were later satisfactorily carried out.

HOSPITAL ACCOMMODATION.

Convalescent Hospital.—The building at New Lambton purchased by the Newcastle hospital authorities for use as a convalescent hospital has been thoroughly renovated. Extensive additions and alterations have been made, and a heating system and septic tank for disposal of sewage installed. The site is well chosen, and offers very suitable surroundings for convalescent patients. The hospital is to be opened early in 1926, and should do much to relieve the existing congestion in the wards of the Newcastle Hospital.

Infectious Diseases Hospital.—The need for an infectious diseases hospital to serve the requirements of Newcastle and district has been emphasised again and again in the annual reports of the Medical Officer of Health, and with a rapidly-increasing population the need becomes more urgent each year. Although plans for the hospital were drawn up in 1919, the matter has been deferred time after time, and nothing further has yet been done. It is hoped that funds for this pressing need will be provided without delay. An average of 675 cases of infectious diseases have been notified annually during the past five years, though notification does not include measles, whooping-cough, or chicken-pox. Two-thirds or more of these cases occurred in the area which would be served by the proposed hospital. At present this area is served by the Newcastle and Wallsend hospitals, whose total beds for infectious diseases number 36, which, in emergency, might be increased to 44 by the use of verandah space. In reality, a number of these beds are used for cases of venereal disease and severe sepsis, so that the available total is under 40 beds. In other countries (*e.g.*, England) the generally accepted standard for infectious diseases is one bed per 1,000 of the population. The population which is at present served by the Newcastle and Wallsend hospitals is over 100,000, who, at the above rate, would require at least 100 beds. Infectious diseases accommodation in Newcastle, therefore, is less than one-half of what is required according to accepted standard. Provision of an infectious diseases hospital would free the existing isolation accommodation at the Wallsend and Newcastle hospitals, and permit of its use for cases of sepsis, skin and venereal diseases.

Another important aspect is lack of provision for handling large epidemics. The existing accommodation is fully taxed, and no facilities exist for dealing with any unusual outbreak of infectious disease, such as smallpox.

VENEREAL DISEASES.

Urgent Need for Night Clinic.—The existing accommodation for outdoor patients at the Newcastle Hospital is very limited. The lack of accommodation is so great that facilities for adequate treatment of venereal disease cannot at present be provided, and the treatment given is palliative rather than curative. There is no doubt that, as in all other large seaports, a great deal of venereal disease exists in Newcastle. The actual numbers are difficult to determine, but it has been estimated that four or five hundred applications for treatment are dealt with each year at the Newcastle Hospital alone. Facilities for laboratory diagnosis of suspected cases are inadequate, and facilities for treatment are so limited that, in many instances, the suspected case can only be given a bottle of medicine and advice for self-treatment, which is generally worse than useless. Persons are continually calling on me to know where treatment can be obtained, but unless the patient has means sufficient to pay a specialist's fees, adequate treatment is difficult to get. Sydney has at least half-a-dozen free night clinics, but up to now this urgent need in Newcastle has not been met.

Plans of an out-patient department at the Newcastle Hospital, which will include a venereal diseases clinic, are at present in course of preparation, but so far nothing definite has been done with regard to the provision of funds for the erection of the building. I regard this as the most urgent health requirement of the district.

MISCELLANEOUS SERVICES

During the year approximately 200 medical examinations were made, comprising (*a*) all first-class pilots stationed at Newcastle; (*b*) candidates for employment in the public services, or public servants requiring medical examination on account of illness or invalidity; (*c*) young persons without means seeking employment in factories for the first time; (*d*) applicants for admission to hospitals or asylums.

Under instructions from the Head Office, visits were made outside the district to Muswellbrook, in connection with a typhoid fever outbreak; to Denman, to report on the sanitary services; and to Tea Gardens, to investigate a diphtheria outbreak.

Bacteriological Laboratory.—Examinations are made of specimens of sputum from the Newcastle Throat and Chest Dispensary, and from medical practitioners in the district. A limited number of throat swabs were examined for diphtheria and a bacteriological investigation of the Newcastle milk supply was commenced. Owing to the facilities afforded by the Newcastle hospital laboratory and by specialists in Newcastle, it was found necessary to examine only a limited number of pathological specimens.

Tables relating to Vital Statistics are appended :—

TABLE 4.—Birth and Deaths—Each Municipality—City of Newcastle and adjacent Suburbs—1925.

Municipality.	Estimated Mean. Population.	Births.						Deaths.					Number who died in Public Institutions (included in foregoing).
		Total Births.			Illegitimate (included in foregoing).			M.	F.	Total.	Deaths under 1 year.		
		M.	F.	Total.	M.	F.	Total.				M.	F.	
Newcastle City	15,240	157	140	297	6	5	11	223	123	346	24	9	270
Adamstown	4,460	62	69	131	1	...	1	11	12	23	2	4	......
Carrington	3,140	40	37	77	6	2	8	15	9	24	...	1	......
Hamilton	16,700	210	209	419	7	10	17	51	37	88	5	8	4
Lambton	4,030	53	43	96	2	...	2	16	17	33	3	6	......
Lambton, New	4,750	67	58	125	1	...	1	8	11	19	3	5	......
Merewether	7,380	121	128	249	17	25	42	20	19	39	8	4	4
Stockton	5,270	64	72	136	1	2	3	15	29	44	4	4	21
Wallsend	7,100	80	70	150	3	1	4	64	45	109	8	7	63
Waratah	14,900	323	278	601	18	9	27	56	48	104	16	5	27
Wickham	13,430	172	177	349	14	18	32	38	38	76	3	11	4
Total	96,400	1,349	1,281	2,630	76	72	148	517	388	905	76	64	393

HUNTER RIVER COMBINED SANITARY DISTRICT.

TABLE 5.—Districts comprised in Newcastle and Suburbs, together with six outside Municipalities, Greta, East and West Maitland, Morpeth, Raymond Terrace, Singleton; and five Shires, Bolwarra, Cessnock, Lake Macquarie, Port Stephens, and Tarro, enumerated below.

Births and Deaths, each Local Area—Hunter River Combined Districts, 1925.

Municipality or Shire.	Estimated Mean Population, 1925.	Births.						Deaths.			Deaths under 1 year.		Number who died in Public Institutions (included in foregoing).
		Total Births.			Illegitimate (included in foregoing).								
		M.	F.	Total.	M.	F.	Total.	M.	F.	Total.	M.	F.	
Newcastle and Suburbs	96,400	1,349	1,281	2,630	76	72	148	517	388	905	76	64	393
Greta	1,580	17	27	44	...	...	...	3	8	11	...	2	......
Maitland East	3,830	56	56	112	2	3	5	19	15	34	3	6	......
,, West	8,830	174	168	342	4	6	10	86	62	148	9	10	93
Morpeth	1,070	7	12	19	...	2	2	1	...	1	...	...	......
Raymond Terrace	860	22	17	39	1	...	1	2	3	5	...	...	......
Singleton	3,270	131	84	215	6	3	9	14	17	31	5	4	10
Bolwarra Shire	3,290	43	46	89	2	1	3	9	10	19	2	1	3
Cessnock	35,410	521	531	1,052	14	8	22	137	115	252	42	27	65
Lake Macquarie Shire	22,570	294	312	606	9	11	20	89	55	144	14	20	25
Port Stephens Shire	3,820	18	12	30	...	...	...	11	3	14	3	1	......
Tarro Shire	5,860	64	77	141	1	5	6	40	29	69	9	9	37
Total	186,790	2,696	2,623	5,319	115	111	226	928	705	1,633	160	147	626

Table 6.—Causes of Death of Children under 1 year—Hunter River Combined Sanitary District—1925.

Causes of Death.	NEWCASTLE AND SUBURBS.												REMAINDER OF COMBINED DISTRICT.											
	Newcastle.	Adamstown.	Carrington.	Hamilton.	Lambton.	New Lambton.	Merewether.	Stockton.	Wallsend.	Waratah.	Wickham.	Total.	Greta.	Maitland, East.	Maitland, West.	Morpeth.	Raymond Terrace.	Singleton.	Bolwarra Shire.	Cessnock Shire.	Lake Macquarie Shire.	Port Stephens Shire.	Tarro Shire.	TOTAL DEATHS.
Measles	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Whooping cough	2	...	...	1	1	...	1	...	...	1	1	7	...	1	3	...	...	...	1	5	3	...	1	21
Diphtheria	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	2
Influenza	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1
Dysentery	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Cerebro-spinal meningitis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
Tuberculosis—intestines, peritoneum	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	1
Other General Diseases	...	...	...	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	...	2	...	...	...	4
Meningitis	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	3	...	...	...	4
Convulsions	1	...	...	1	...	...	...	...	...	...	...	2	...	1	...	...	...	1	...	2	1	...	...	7
Bronchitis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	1	...	...	6
Pneumonia	7	...	1	...	1	...	...	...	...	1	1	11	1	...	1	...	...	2	...	8	1	1	1	26
Gastritis	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Diarrhœa and enteritis	10	...	...	2	1	...	...	2	3	3	1	22	1	...	3	...	...	...	...	10	4	...	3	43
Intestinal obstruction	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	2
Diseases of the Skin	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
Congenital malformations	3	...	...	2	...	3	1	1	4	3	...	17	...	1	1	...	...	...	...	4	1	...	2	26
Congenital debility	1	2	...	2	1	1	4	1	...	2	3	17	...	...	...	...	...	...	...	8	4	1	2	32
Premature birth	8	2	...	5	3	4	2	2	6	8	3	43	...	3	8	...	...	3	1	14	11	2	4	89
Injury at birth	...	...	...	...	...	...	...	1	1	1	2	5	...	...	1	...	...	...	...	2	3	...	...	11
Other diseases peculiar to early infancy	...	1	...	...	1	...	2	1	...	1	1	7	...	1	...	...	...	1	1	3	3	...	3	19
Accident	...	1	...	...	1	...	...	...	...	1	...	3	...	...	...	...	...	...	...	1	...	...	...	4
All other causes	1	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	1	...	1	1	...	...	6
Total	33	6	1	13	9	8	12	8	15	21	14	140	2	9	19	...	...	9	3	69	34	4	18	307

Deaths of infants at ages (months):—Under 1 month, 180; 1 to 2 months, 30; 3 to 5 months, 32; 6 to 11 months, 65; total, 307.

Table 7. Causes of Death—Hunter River Combined Sanitary District—1925.

Causes of Death.	NEWCASTLE AND SUBURBS.												REMAINDER OF COMBINED DISTRICT.											Deaths in Institutions (included in foregoing).	AGES.									Total Deaths.
	Newcastle.	Adamstown.	Carrington.	Hamilton.	Lambton.	New Lambton.	Merewether.	Stockton.	Wallsend.	Waratah.	Wickham.	Total.	Greta.	Maitland, East.	Maitland, West.	Morpeth.	Raymond Terrace.	Singleton.	Bolwarra Shire.	Cessnock Shire.	Lake Macquarie Shire.	Port Stephens Shire.	Tarro Shire.		Under 1	1 – 4	5 – 13	14 – 19	20 – 29	30 – 39	40 – 49	50 – 64	65 and over.	
Typhoid Fever	1	...	...	...	...	...	...	...	2	...	...	3	...	...	2	...	...	...	...	...	...	...	...	5	...	1	...	1	...	1	2	...	...	5
Measles	...	...	...	1	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	2
Scarlet Fever	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	2	...	...	...	...	...	...	...	2
Whooping Cough	5	...	...	1	1	...	2	...	1	1	1	12	...	1	4	...	...	...	1	6	3	...	2	11	21	6	1	...	...	...	...	1	...	29
Diphtheria	3	...	...	...	...	...	...	...	5	...	...	8	...	...	4	...	...	...	...	...	1	...	1	12	2	9	3	...	...	...	...	...	...	14
Influenza (with Pneumonia)	...	...	...	...	...	...	...	...	1	1	...	2	...	...	3	...	...	...	...	2	...	...	...	4	1	...	...	...	1	...	2	2	1	7
Influenza (Other)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	1	1	2
Dysentery	1	...	...	...	...	...	...	...	...	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	2
Erysipelas	1	...	...	...	...	...	1	...	...	...	...	2	...	...	1	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	1	...	1	3
Lethargic Encephalitis	...	...	...	...	2	...	...	...	...	1	...	3	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	2	1	1	...	4
Cerebro-spinal Meningitis (Epidemic)	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	1	2	1	...	...	1	...	...	...	...	...	2
Other Epidemic Diseases	5	...	...	...	...	...	...	...	...	...	...	5	...	...	2	...	...	...	...	...	...	...	1	8	...	...	5	...	...	2	...	1	...	8
Tuberculosis of Respiratory System	10	1	1	2	2	1	3	1	...	6	3	30	...	1	6	...	...	1	...	6	3	...	1	12	...	...	1	2	11	13	8	9	4	48
Tuberculosis-Meninges	1	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	3	...	...	...	5	...	2	1	1	1	...	...	...	...	5
Other Tuberculous Diseases	3	...	1	...	...	...	...	...	...	...	1	5	...	...	...	...	...	...	...	...	...	...	...	2	1	...	1	1	...	...	1	1	...	5
Cancer	28	3	7	9	3	1	3	2	5	15	11	87	1	3	9	...	1	1	1	19	13	2	4	40	...	...	1	...	...	6	19	51	64	141
Diabetes	5	...	...	2	...	...	2	...	1	1	...	11	...	...	4	...	...	1	...	1	...	...	...	9	...	...	...	...	1	1	1	7	7	17
Other General Diseases	14	1	...	4	1	1	...	...	2	2	3	28	...	1	3	...	...	...	...	10	...	...	1	20	4	1	6	4	4	1	9	12	2	43
Meningitis	5	...	...	...	...	...	1	...	...	1	...	7	...	...	1	...	...	...	...	5	...	...	...	9	4	4	2	1	...	...	1	1	...	13
Cerebral Hæmorrhage	13	...	3	6	...	...	2	1	4	3	6	38	...	1	2	...	...	3	2	9	8	...	2	19	1	...	...	1	...	3	9	11	40	65
Convulsions of Infants	1	...	...	1	...	...	...	...	...	...	...	2	...	1	...	...	...	1	...	2	1	...	1	1	7	1	...	...	...	...	...	...	...	8
Other Nervous Diseases	13	...	...	2	2	2	...	11	...	4	1	35	...	...	3	...	1	2	...	9	1	...	3	29	1	...	8	2	6	4	4	12	17	54
Diseases of the Heart	45	7	4	13	7	3	7	4	16	15	15	136	4	11	19	...	2	1	6	38	25	4	6	68	...	2	5	7	4	5	22	75	132	252
Other Circulatory Diseases	15	2	1	2	2	1	...	3	1	2	1	30	...	2	3	...	...	...	...	6	11	1	1	19	...	...	1	...	...	1	4	15	33	54
Bronchitis	7	...	...	3	1	...	...	...	5	...	2	18	1	1	2	...	...	...	...	6	7	...	...	10	6	4	2	...	...	1	1	4	17	35
Pneumonia	32	...	2	4	2	...	1	3	11	3	7	65	1	1	15	...	...	4	...	12	7	1	3	52	26	25	2	2	2	4	9	17	22	109
Other Respiratory Diseases	2	...	...	2	1	...	...	2	1	1	...	9	...	1	2	...	...	2	...	1	4	...	...	4	1	1	...	...	...	2	1	4	10	19
Diseases of the Stomach	2	...	...	1	...	...	1	...	2	...	...	6	...	...	...	...	...	...	...	1	1	...	...	5	...	1	...	...	...	...	2	1	4	8
Diarrhœa and Enteritis	15	...	...	4	1	1	...	2	4	6	1	34	1	...	12	...	...	...	...	20	6	...	4	41	43	23	1	...	...	1	1	3	5	77
Appendicitis	6	...	...	...	...	...	...	...	2	1	...	9	...	...	3	...	...	1	...	3	...	...	1	17	...	...	1	2	2	5	2	4	1	17
Hernia, Intestinal Obstruction	11	...	...	...	...	...	...	...	1	...	...	12	...	...	1	...	...	1	...	2	...	...	2	17	2	...	...	1	2	1	3	2	7	18
Cirrhosis of the Liver	3	...	...	...	...	...	...	1	...	1	1	6	...	...	...	...	...	1	...	2	...	...	...	5	...	...	...	...	...	...	1	7	1	9
Peritonitis	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	2	...	...	1	...	...	...	1	...	1	...	...	1	3
Other Digestive Diseases	4	...	...	1	...	...	...	...	2	2	...	9	...	...	5	...	...	2	...	2	...	...	1	9	...	1	2	1	2	1	1	4	7	19
Bright's Disease (Acute and Chronic)	18	1	2	7	1	...	2	3	5	5	5	49	...	1	6	1	...	1	1	9	6	1	2	33	...	2	...	1	7	6	8	28	25	77
Other Genito-Urinary Diseases	10	1	...	...	...	...	1	...	5	3	...	26	...	...	4	...	...	...	...	1	3	...	3	20	1	...	1	...	...	3	3	7	16	31
Puerperal Septicæmia	5	...	...	...	...	...	...	...	2	1	...	8	...	...	3	...	...	...	...	1	1	...	...	11	...	...	...	1	7	4	1	...	...	13
Other Puerperal Diseases	9	...	...	...	...	...	...	...	2	1	...	12	...	...	2	...	...	1	...	2	1	...	...	12	...	...	...	1	7	5	5	...	...	18
Premature Birth	8	2	...	5	3	4	2	2	6	8	3	43	...	3	7	...	...	3	1	14	11	2	4	15	88	...	...	...	...	...	...	...	...	88
Other Developmental Diseases of Infants	4	3	...	5	2	4	7	4	5	7	6	47	...	2	3	...	...	2	1	17	11	1	7	14	89	2	...	...	...	...	...	...	...	91
Senility	2	1	...	12	...	...	3	2	1	6	4	31	...	1	2	...	1	1	3	5	3	...	2	8	...	...	...	...	...	...	...	...	49	49
Suicide	2	...	...	...	...	...	...	...	...	2	...	4	...	1	2	...	...	1	1	2	1	1	...	4	...	...	...	1	2	6	...	1	3	13
Accident	31	1	2	1	1	...	...	...	13	3	3	55	3	...	10	...	...	1	2	28	8	1	15	63	4	12	12	17	14	11	20	16	17	123
All Other Causes	6	...	1	...	1	1	...	3	3	2	...	17	...	2	1	...	...	...	...	5	5	...	1	7	3	2	1	...	3	4	3	9	6	31
Total	347	23	24	88	33	19	38	44	109	104	76	905	11	34	148	1	5	31	19	252	144	14	69	626	307	104	57	49	76	94	145	307	494	1,633

Broken Hill and District.

ANNUAL REPORT OF THE MEDICAL OFFICER OF HEALTH (Dr. R. S. TROTTER) FOR THE YEAR ENDED 31st DECEMBER, 1925.

I herewith submit my report compiled from observations extending over the period of my residence (15th September to 31st December, 1925) and from data collected from what I considered trustworthy sources.

Vital Statistics.

Population.—Estimated population, 28,000. Births: There were 688 births (males 367, females 321); rate per thousand of population, 24·5. Deaths: There were 283 deaths (males 167, females 116), which would give an annual death-rate of 10·1 per thousand on an estimated population of 28,000.

Principal Causes of Death were as under:—Diseases of the heart and circulatory system, 53; diseases of the kidneys and genito-urinary system, 41; phthisis and other tuberculous diseases, 32; respiratory diseases other than phthisis, 29; prematurity of birth and developmental diseases of infants, 20; diarrhœa and enteritis, 21. The figures for deaths from respiratory diseases other than phthisis (of which several cases were of the nature of fibroid phthisis) are not high, considering the climatic variations and the prevalence of dust about the mines and the district.

Cancer: There were 14 deaths. Early recognition and treatment are the only known means of prevention; and medical advice should be sought whenever there is reason for suspicion. Plumbism: Only one death is ascribed to this cause; evidence of illness due to lead is carefully looked for among the miners and workers in lead in order that they may immediately receive treatment. Whether plumbism may not be a factor in the production of other disease is a subject on which much interesting work might be done, with a view to determining its influence in the production of nervous, heart, and kidney diseases and also its possible influence in abortions and miscarriages.

Infantile Mortality.—There were 47 deaths of infants under 1 year of age. The highest proportion of deaths (19) was at the age period under one week.

Table showing Number of Deaths of Children under one year and rate per thousand births for the ten years 1916 to 1925.

Year.	No. of Deaths.	Rate per 1,000 Births.	Year.	No. of Deaths.	Rate per 1,000 Births.
1916	91	96·3	1921	86	122·85
1917	85	83·33	1923	65	91·68
1918	107	99·16	1924	110	146·00
1919*	145	146·65	1925	47	68·5
1920	91	111·79			

* Influenza year.

The number of deaths assigned to prematurity of birth and developmental diseases emphasises the need for an ante-natal clinic for expectant mothers at the hospital, and for pregnant women to seek early advice from her family doctor. Information can also be obtained by prospective mothers from the nurses attached to the Baby Health Centres. Diarrhœa and enteritis are largely preventable by proper care and attention to cleanliness in connection with food, particularly by keeping it carefully protected from flies; and by seeing that young infants are suitably clothed to enable them to resist chills.

Notifiable Infectious Diseases.

One hundred and twenty-eight cases of infectious disease were notified as occurring in Broken Hill—typhoid fever, 90 cases, 10 deaths; diphtheria, 26 cases, no deaths; scarlet fever, 9 cases, no deaths. Two cases of polioencephalitis, and one case of encephalomyelitis were also notified. May was the month of heaviest incidence for typhoid fever (20 cases), followed closely by December (17 cases).

Tuberculosis.—It would be in the interests of public health to make tuberculosis a notifiable disease in this area.

Delay in Notifying Cases.—Frequently there has been a considerable interval between removal of a case to hospital and its notification to the local authority. Attention of the local medical practitioners has been drawn to the provisions of the Public Health Act in regard to notification.

Typhoid fever appears to be endemic in Broken Hill and the distribution and incidence is suggestive of typhoid carriers. The place is fly-infested and a considerable number of cases may be caused by infection of food. Water, too, may be a factor; it is possible that certain cases might originally arise from soil infection through the entrance by suction of infected matter into a burst water pipe. Owing to the low condition of the water in the reservoir, the public were warned not to drink unboiled water, but it is doubtful if much heed was taken of the warning. Preventive (anti-typhoid) inoculation is little practised, but it would be well if people would consider more carefully the advantage of this procedure.

Every opportunity was taken to have a good deal of cleaning up done in the neighbourhood where cases of infectious disease occurred.

Disposal of Refuse.

The scavenging service on the whole is well carried out; and the ground allotted for entrenchment is spacious enough to serve for several years. In some places the "Kaustine" system is in use, and is proving satisfactory. The effluent is pumped out of the tanks periodically and taken away in tank carts for disposal at another depot, which deals with liquid refuse. Cesspits are dealt with in the same manner. The liquid refuse is put from the tank carts into trenches for absorption by the soil and by the trees, bamboos, &c., which have been planted in their vicinity to assist in the process of absorption. The effluent from septic tanks is mostly dealt with by the mines, which endeavour to conduct it into places where it is not likely to become objectionable. It is a moot-point for consideration whether this effluent could not be utilised to greater advantage, for instance, on tree-planting areas, or in the growing of fodder, &c. Slop water is a cause of frequent trouble and complaint; where no garden space is available slop disposal is into the back lane.

Garbage and rubbish is taken to dumps in various parts of the outskirts of the city or burnt. Many people have their own incinerators for burning the rubbish from their establishments. Disposal of horse, cow, and goat manure is a difficult problem. The general rule now being insisted upon is provision of fly-proof manure bins of a capacity of not more than one week's supply, such bins to be cleaned out or their contents burned at least once a week. Strict observance of this requirement should help in mitigating the nuisance arising from flies. Ordinary street scavenging is carried out regularly. Owing to the shortage of water, street watering was irregular, thereby increasing the nuisance from dust. Considerable improvement is being made by tar-macadamising several of the main streets and roads.

Town Planning.—An efficient system of town planning should be inaugurated by the municipal authorities. In some parts of the city there is overcrowding of buildings on land, and between some streets there are no lanes. This is a source of difficulty in removal of refuse from back-to-back houses, and adds considerably to the cost and inconvenience of carrying out the sanitary services.

Housing.—There is a large number of more or less dilapidated houses. The worst houses are gradually being closed up as opportunity offers, but the structural alterations required to bring many up to a reasonable standard are difficult to enforce. There is enough housing work to occupy an inspector for at least a year. The present method of dealing with the closing of houses is slow, cumbrous, and unsatisfactory.

INSPECTION OF FOOD PREMISES.

Boarding-houses, Restaurants, &c.—Several premises were being conducted on unsatisfactory lines, but much improvement has resulted from efficient inspection, although much remains to be done to prevent lapse into slovenly habits.

Butchers' and Bakers' Shops, Confectionery and Ice Cream Premises.—Many were in a more or less unsatisfactory state when first inspected, according to ordinary standards of cleanliness. There were also many structural defects. All are now up to a satisfactory standard as regards cleanliness, and structural requirements have been made, with one exception, where extensive alterations were necessary and are in progress.

Analyses of Ice Cream.—Eight samples were taken and were found to be below standard on analysis. Prosecutions were successfully instituted.

Dairies.—There is a sufficient number of dairies to maintain an adequate milk supply under ordinary circumstances; samples of milk were taken for analysis, the quality generally being good. Only two prosecutions were necessary, one for use of preservative and the other for dilution of milk. In both cases the milkman was fined; in the latter case a heavy fine was inflicted, as it was a repeated offence.

Fish Shops.—Regular inspection is made to see that all offensive matter from these places is removed promptly or burnt, and that the fish and material in which it is cooked are of good quality.

Noxious Trades.—Offensive material is dealt with on the spot by steaming, special trenching, burning, and removal.

Abattoirs and Piggeries.—These premises are out of the city and are kept in as good order as local circumstances will permit.

Inspections, other than dwellings, comprised 512 food premises; 309 inspections in regard to complaints of nuisance, &c.; and 15 picture theatres.

Swimming Baths.—There is one large public swimming bath, the refuse water from which is used for the purpose of watering trees, shrubs, &c. Another such bath at South Broken Hill would be of advantage if water could be spared for that purpose.

Picture Theatres and Places of Amusement.—The sanitary arrangements at some premises left much to be desired. In one case where this is very difficult proceedings have been withheld pending a renewal of lease and reconstruction of the sanitary conveniences.

Public Reserves.—These open spaces are of great advantage to the city, are well planted with trees, shrubs and flowers, and are well attended to. Shortage of water at times is a great hindrance to the preservation of the plants.

Schools.—These are as a rule well built, well lit and well ventilated, with ample space for playgrounds. Good taste is shown in the gardens and in the lawns, and the scholars seem to take great interest in them. Latrines are kept clean, but some are devoid of a desirable amount of privacy. There was an opportunity of seeing a great many of the children at lectures and talks given in the schools and outside in the beginning of November, and their general healthy appearance was a matter of remark.

Health Week was held in the first week in November and attracted considerable attention. A principle feature was the show of babies and infants, and a finer collection it would have been difficult to have found in any city of similar size. Great interest was taken in the display by the Baby Health Centres and classes for the care and feeding of babies. It is to be hoped that the Health Committee of the Council will organise another campaign in the coming year with the assistance of enthusiastic local people.

Agencies working in the interest of Public Health.—Various agencies are working more or less independently of each other, *e.g.*, Child Welfare Work, Baby Health Centres, District Nursing, Nursing Homes, Bureau of Medical Inspection, Hospital, Health Committee of the Municipal Council, Department of Labour and Industry, Mines, Country Women's Party, and other private organisations. It would be well if some arrangement could be made whereby these could in some way work in with each other.

Maternity Homes.—The greatest need at the present time is the provision of proper maternity homes for the reception of cases from the city and country. The proposed maternity wards at the hospital should meet a long felt want and be of great benefit.

Provision for aged and infirm persons.—Another urgent need is a home or institution for the aged and infirm people of the district who have no one to look after them. At present much delay occurs in getting old people to a home, to which they can only be conveyed by a long and trying railway journey.

Water Supply.—The dry weather caused a dangerous shortage of water. The reservoirs were very low, and that at Stephens Creek gave out entirely. The steady evaporation is responsible for a large loss of water annually, and the concentration does not improve the quality of the water. The geological formation of the district suggests that large supplies of underground water exist, which might be utilised by the mines for milling purposes.

Conclusion.—The Municipal Council greatly facilitated my work by providing me with an office and motor transport, without which it would have been impossible to have got through anything like the amount of work that has been done. Great kindness and courtesy was also shown to me by the Mayor, Aldermen and officers of the Council. It has been a pleasure to have tried to help forward the sanitary progress of Broken Hill, and I wish to express regret at having, for health reasons, to sever my connection with the city, and I thank the people generally for the kindness and consideration extended towards me.

R. S. TROTTER,
Medical Officer of Health.

TABLE I.—Causes of Death of Infants under 1 year, 1925, City of Brokne Hill.

Cause of Death.	Under 1 wk.	1–2 wks.	2–3 wks.	3–4 wks.	1–2 mths	2–3 mths	3–4 mths	4–5 mths	5–6 mths	6–7 mths	7–8 mths	8–9 mths	9–10 mths	10-11 mths	11-12 mths	Total
Prematurity of birth	9	2	...	...	1	...	...	...	...	...	...	...	...	...	...	12
Other developmental diseases of infants	5	...	1	...	...	1	1	...	...	...	...	...	...	...	...	8
Diarrhœa and enteritis	...	...	...	...	1	1	3	1	...	...	2	2	1	2	...	13
Other diseases of digestive system	...	...	...	...	...	...	2	...	...	...	...	...	...	1	...	3
Heart disease and disease of circulation...	4	...	...	...	...	...	...	...	...	1	...	...	...	...	...	5
Broncho-pneumonia	1	...	...	...	...	...	1	...	...	...	...	1	...	1	...	4
Encephalitis	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	2
Malignant adenoids	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
Total	19	2	1	...	2	3	8	1	...	2	2	3	1	4	...	48

TABLE II.—Deaths in the City of Broken Hill, 1925.

Cause of Death.	Under 1 year.	1–4 years.	5–14 years.	15–24 years.	25–34 years.	35–44 years.	45–54 years.	55–64 years.	65-70 years.	Age not stated.	All ages.
Enteric fever	...	1	1	3	2	...	2	1	...	...	10
Erysipelas	...	...	...	...	...	...	...	...	1	...	1
Rheumatism	...	...	2	...	...	...	...	...	...	...	2
Infantile paralysis	...	1	...	...	...	...	...	...	...	...	1
Encephalitis (all forms)	2	4	1	...	1	...	...	...	...	...	8
Phthisis	...	...	...	3	5	4	6	9	3	...	30
Tuberculous meningitis	...	1	...	...	...	...	...	...	...	...	1
Other tuberculous diseases	...	...	...	...	1	...	...	...	...	...	1
Meningitis pneumococeal	...	1	...	...	...	...	...	...	...	...	1
Diarrhœa and enteritis	14	6	...	...	...	1	...	...	...	...	21
Puerperal fever	...	...	...	3	...	...	...	...	...	...	3
Other diseases of pregnancy and parturition	...	...	...	3	2	...	...	...	...	...	5
Prematurity of birth	12	...	...	...	...	...	...	...	...	...	12
Other developmental diseases of infants ...	8	...	...	...	...	...	...	...	...	...	8
Heart disease	4	...	...	1	2	2	3	14	14	...	40
Cerebral hæmorrhage	...	...	...	...	...	...	...	2	4	...	6
Other diseases of circulation	1	...	...	...	...	...	...	2	4	...	7
Bronchitis	...	1	...	...	...	...	...	...	1	...	2
Broncho-pneumonia	3	4	1	...	...	1	...	...	1	...	10
Labour pneumonia	...	2	1	1	2	6	1	1	2	...	16
Other respiratory diseases	...	...	...	...	...	1	...	...	...	...	1
Kidney diseases	...	...	...	1	4	4	10	6	10	...	35
Genito-urinary diseases	...	...	...	...	1	1	2	...	2	...	6
Cancer	...	...	...	...	...	1	2	5	6	...	14
Diabetes	...	...	...	...	...	...	1	...	...	...	1
Plumbism	...	...	...	...	...	...	1	...	...	...	1
Appendicitis	...	...	1	...	1	1	...	...	...	...	3
Intestinal obstruction	...	...	...	1	...	1	...	...	...	...	2
Peritonitis	...	...	...	...	...	....	...	...	1	...	1
Cirrhosis of liver	...	...	...	...	...	...	...	1	...	...	1
Other diseases of digestive system	3	1	...	1	...	...	2	...	2	...	9
Suicides	...	...	...	1	1	1	...	...	...	1	4
Accidents	...	1	2	1	...	3	...	1	2	...	10
Senile decay	...	...	...	...	...	...	...	...	8	...	8
Other causes	1	...	...	...	...	...	...	...	1	...	2
Totals	48	23	9	19	22	27	30	42	62	1	283

INFANT MORTALITY—BROKEN HILL.

Report by Dr. E. Sydney Morris, Senior Medical Officer of Health and Director of Maternal and Baby Welfare.

1.—*General Outline.*—The problem of infant mortality at Broken Hill was investigated as carefully as time would permit during my recent visit to that city.

The Western District of New South Wales, especially that portion represented by Broken Hill, constitutes a difficulty which must be surmounted at all costs. If we cannot reduce the infant mortality rate there, we have no encouraging prospect for the State as a whole.

Whilst the infant mortality rate has shown for many years a more or less progressive decline in the State as a whole, the rate in Broken Hill, apart from being generally excessive, shows marked periodic increases which are deplorable. The position can be seen from the following Table I:—

Table I.—Infant Mortality Rate, New South Wales and Broken Hill. Deaths under 1 year per 1,000 Births.

Year.	New South Wales, including Broken Hill.	Broken Hill.	Year.	New South Wales, including Broken Hill.	Broken Hill.
1916	67·8	96·3	1921	62·9	122·85
1917	57·5	83·33	1922	54·0	97·00
1918	59·2	99·16	1923	61·0	91·68
1919	72·3	146·65	1924	59·5	146·00
1920	69·9	111·79	1925	54·9	68·5

The high rates shown, which exceed the corresponding rates of the State by 100 per cent. to 200 per cent., result for the most part from the varying incidence of epidemic gastro-intestinal infection. The terms used to describe this condition in death certificates are various: Summer diarrhœa, gastro-enteritis, entero-colitis, ileo-colitis, &c., are those generally favoured. On closer inquiry, however, I have been forced to the conclusion that the vast majority of these cases are really bacillary dysentery. Breast-fed children are not immune to the infection which frequently brings about a fatal result in forty-eight hours.

The symptoms are marked by collapse, frequent stools and tenesmus accompanied by blood and mucus. In discussing this question with the Medical Superintendent of the hospital (Dr. Kneebone), I was informed that in a few cases which it was possible to investigate bacteriologically, a type of organism closely resembling, if not actually, the bacillus of Shiga was isolated. Laboratory facilities of first-class calibre are badly needed and in this field alone there is ample scope for a very exhaustive investigation.

The question of providing laboratory facilities for Broken Hill is dealt with in a special report submitted by me on 9th August, 1926.

From purely epidemiological considerations I am inclined to believe that bacillary dysentery is endemic in Broken Hill and that the infection is fly-borne. It is essential, as a first step in the reduction of infant mortality that the sanitation of Broken Hill be considerably improved. The question of the many glaring defects in general sanitation, with suggestions for meeting the situation, will be dealt with later in this report.

Meanwhile I would stress the fact that Baby Health Centres alone will not meet the situation. They are an essential unit in the campaign, but unless supported by a rigorous enforcement of public health measures their good work is nullified.

The relationship of "gastro-enteritis" to the infant mortality rate can be seen in Table II:—

Table II.—Infant Mortality from Gastro-enteritis. Deaths under 1 year per 1,000 Births.

Year.	Metropolis.		Western Division.		Whole State less Western Division.	
1915	20.22	16·61	38·56	33·82	8·77	10·94
1916	15·73		30·20		8·65	
1917	13·75		30·28		10·83	
1918	11·37		20·55		9·40	
1919	22·00		49·51		17·05	
1920	19·82	15·94	36·89	39·20	17·52	13·67
1921	17·17		42·32		13·93	
1922	14·08		40·46		10·00	
1923	18·51		30·22		15·06	
1924	10·16		46·11		11·83	
Reduction or increase per cent.	Reduction, 4·3 per cent.		Increase, 16 per cent.		Increase, 25 per cent.	

It will be noted that the reduction which has been brought about in the Metropolis is masked in State statistical returns by the marked increase in the Western Division and the still greater increase in the other extra-metropolitan districts. The Metropolis represents the area where the main efforts of the Baby Health Centres have been made, but even here they were very handicapped until about 1924, as it was not until this year that all the nurses had received special training at "Tresillian."

The first Baby Health Centre was opened at Broken Hill in 1918. In 1921 three additional centres were opened. Apart from centres established in the Maitland and Newcastle industrial districts there have been only two main country centres opened—Wagga in 1922, and Lithgow in 1923. Bathurst was opened only this year.

I am sanguine enough to believe that the Metropolis will show progressive improvement in the future. The outstanding problem is to afford adequate facilities for country districts. In 1924 gastro-intestinal infection accounted for 21 per cent. of the total infant mortality in the whole State, whereas in Broken Hill it accounted for 54 per cent. of the total infant mortality. Until we can permanently reduce the loss from this cause we shall not achieve the success which is our goal.

It constitutes the crux of the problem in Broken Hill, but can, I believe, be controlled if proper steps are taken.

2. *Sanitation in relation to Infant Mortality.*—The general sanitation of Broken Hill is disgraceful. The conditions which are accepted as normal would be liable to precipitate epidemics of infectious disease in any community. The climate, scarcity of water and similar local peculiarities make the possibility of such epidemics practically a certainty.

The experience of past years has shown that typhoid is both endemic and epidemic, and the same may be said, in my opinion, in regard to bacillary dysentery.

A special report on the unsatisfactory disposal of nightsoil has been already submitted. The earth-closets in most parts of the city are in a very bad state; fly-breeding may be said to be encouraged, and a sanitary conscience of the average householder scarcely exists.

To attack this aspect of the problem this Department must be prepared to act along with, rather than through the local authority.

The peculiar psychology of the public makes the enforcement of any law a very difficult matter. This is evident, expecially, in connection with the provisions of the Acts relating to the Pnblic Health.

It is notorious that local authorities in general tend to take the path of least resistance in questions of public health. This characteristic is exemplified by the local authority of Broken Hill, and in addition personal considerations seem to me to play a very active part in the administration of the various Health Acts.

On this account the local inspector finds himself in an invidious position. His recommendations are not necessarily dealt with on their merit, and the offender is apt to be regarded as a persecuted individual. It is essential, in my opinion, to have a sanitary inspector of this Department more or less permanently in the Western Division of the State.

He should spend several months at a time in Broken Hill, and should rigorously enforce the provisions of the Public Health and allied Acts independently, if necessary, of the local authority. At the present time there is urgent need for such an officer, who will be fully employed for six months, at least, in making some impression on the existing sanitary conditions. In my opinion, an active, reliable sanitary inspector would prove more valuable than a medical officer of health alone. As difficulty exists in obtaining the services of suitable medical men, there should be no delay in providing a sanitary inspector.

Medical questions or problems could be submitted to Head Office if necessary, but it will be found that these will be neither frequent nor urgent. The outstanding requirement for Broken Hill is a sanitary "spring-cleaning" and it is essential that this be instituted before the coming summer.

Once the inevitable resistance to the change is broken down, I am hopeful that public opinion will support our efforts, and will not tolerate a state of affairs as that which exists at the present time.

3. *Scope of Baby Health Centres.*—Granting that the general sanitation is improved and maintained thus, I feel sure that the efforts of the Baby Health Centre nurses, in co-operation with other factors, will achieve excellent results.

At the present time the Baby Health Centres in Broken Hill have about 70 per cent. of the mothers under their influence for a longer or shorter time. The vast majority of these mothers are regular attendants, and very few of their babies die during the first year of life. Some of the mothers only call once, and then rely on "grand-mother" or the "lady-next-door" for advice. The nurses, of course, keep in touch with them by home visitation until their reception becomes frigid or they are informed that their services are not required.

After abstracting the names of all infant deaths from the local register of deaths, and tracing these through the Baby Health Centre records, I have concluded that about three fourths of the annual deaths occur among the babies (*i.e.*, 30 per cent of total births) who do not come under the influence of the Baby Health Centres at all in spite of repeated personal requests to do so by the nurses.

There are, of course, mothers who do not appear to be interested in the nurses' efforts; others who will not follow the advice given; some were hopeless in average mental equipment. These classes of mothers are not peculiar to Broken Hill, but the great misfortune is that at Broken Hill any indifference or neglect is very liable to prove fatal, whereas elsewhere it may be survived.

4. *Pre-natal Causes.*—Taking the first month mortality as an indication of the incidence of detrimental pre-natal influences, it appears that Broken Hill is at no disadvantage when compared with the State as a whole.

Whereas 54 per cent. of total State mortality in 1924 occurred in the first month of life, only 47 per cent. occurred at Broken Hill. In 1925 Broken Hill shows only 41 per cent. as occurring in the first month of life.

Though this special problem will form an important aspect of the general campaign for the reduction of maternal and infant mortality, there is no need at the present moment to single out Broken Hill for attention. The same causes are at work to an even greater extent throughout the State, and can only be controlled by affording facilities for ante-natal supervision and by educational propaganda.

The completion of the Maternity Block extensions at the hospital will be a great help in providing suitable accommodation for lying-in cases. It is anticipated that arrangements for ante-natal care will be instituted later.

5. *Treatment of "Gastro-enteritis" Cases.*—In the late summer and autumn, when gastro-intestinal infection in children is apt to assume epidemic proportions, the local hospital often finds difficulty in accommodating all cases in need of treatment.

Up to the present these cases have been treated in the Children's Ward, alongside other medical and surgical cases. This is, of course, dangerous, but could not be avoided. However, I understand that as the result of strict precautions no cross-infection has occurred in this ward. In future, it is proposed to utilise one of the new infectious wards brought into existence by the conversion of the "sanatorium" block. This will enable a large number of cases to be treated, and also retained during a longer convalescence than hitherto.

It has been found that when a child has recovered and is returned to its home, the mother, in certain cases, is so indifferent in her care that the child returns to the hospital in a short time as ill as before. So glaring have been certain of these instances that the Medical Superintendent has been compelled to inform the mother that the child would not be admitted into hospital again for the same complaint.

Partly owing to the demands for hospital accommodation and partly owing to parents not seeking treatment early enough, the serum treatment of this (?) bacillary dysentery has not been markedly successful. The earlier the serum can be administered the greater the prospects of success, and in cases where the serum is given within twenty-four or thirty-six hours of onset, good results have been obtained.

Still another difficulty confronts the hospital when gastro-intestinal infections are prevalent, namely the impossibility of obtaining trained nurses for a few months' work in the summer time.

In order to meet this difficulty I tentatively arranged with Dr. Kneebone (Medical Superintendent) to send three additional nurses to Broken Hill during the summer and autumn months should he desire them. These nurses will work under his supervision and control, will be accommodated at the hospital, but will be deputed exclusively to the ward for gastro-intestinal cases.

By such intensive efforts and co-operation it is hoped that infant mortality will be considerably reduced. *It should be distinctly understood, however, that these efforts will prove futile unless supported by a scheme for general sanitary improvement which must proceed concurrently.* If this latter scheme cannot be instituted, the expense involved in sending extra nurses to Broken Hill cannot be justified.

6. *Co-operation with Doctors and Midwives.*—During my visit I arranged, through the helpful courtesy of Dr. McGillivray, a meeting at the Baby Health Centre of all the medical men in the city.

The whole problem of maternal and infant mortality was discussed. It is pleasing to note that a most harmonious understanding exists between the profession and the nurses of the Baby Health Centres. It was unanimously agreed at this meeting that the next essential step is a sanitary "spring-cleaning." There are about thirty midwives in actual practice at Broken Hill. With a few exceptions they are all untrained women. The Baby Health Centre nurses, at my request, arranged an afternoon meeting to which they were all invited. About twenty accepted the invitation, and I addressed them on their responsibility and their opportunities for assisting in this work. There is little doubt that such meetings are of the greatest value in securing the co-operation of the midwife and enlisting her support in the movement generally.

It is perhaps worthy of record that within a day or so of my address some of the midwives brought specimens of patients' urine to the Baby Health Centres to be examined by the nurses. In all probability this is the first occasion on which these midwives have ever had such tests carried out, and is an indication of the value of educational propaganda. This is all the more important when it is recognised that a large proportion, if not the majority, of midwifery cases, are attended without a doctor.

The co-operation which exists between the hospital and the Baby Health Centres is excellent. The hospital notifies the centres of the discharge of any infant who is in need of dietetic supervision, and the nurses get into touch with the case at once.

7. *Educational Propaganda.*—This is necessary not only in Broken Hill but also throughout the State and it is unfortunate that so far it has not been possible, owing to official delay, to commence a publicity campaign. Once this campaign is in full swing it will give an impetus to the movement and will eliminate much of the ignorance and passive indifference which are the great obstacles to progress.

The editors of both local papers (*Barrier Truth* and *Barrier Miner*) assured me that they would devote as much space as possible to publish any facts or propaganda supplied to them, and would periodically support our efforts with leading articles.

Since my return certain classes of school girls at Broken Hill have been given demonstrations at the Baby Health Centres and it is hoped to continue these in the future and also to institute similar classes wherever possible, throughout the State.

SUMMARY.

(*a*) Broken Hill and the Western Division of New South Wales have an excessive infant mortality which constitutes a problem of the greatest magnitude.

(*b*) This mortality must be reduced if New South Wales is to compare favourably with other States and countries.

(*c*) The chief cause of this excessive mortality is probably bacillary dysentery.

(*d*) Baby Health Centres alone cannot solve the problem. Improvement of the general sanitation is an urgent necessity and of vital importance.

(*e*) 70 per cent. of total annual babies in Broken Hill come under the influence of the Baby Health Centres, but 75 per cent. of the total mortality occurs among those babies (30 per cent.) who do not attend the centres.

(*f*) Ignorance and indifference on the part of mothers may not necessarily be followed by fatal results, but owing to the peculiar local conditions they tend to exact a certain and very heavy toll of infant life in Broken Hill.

(*g*) Pre-natal causes of infant mortality are no greater, perhaps not so great, than in the State as a whole.

(*h*) Intensive efforts during the late summer and autumn, especially in co-operation with the local hospital, give prospects of improving the situation.

(*i*) Co-operation between the Baby Health Centres, doctors and midwives is satisfactory.

(*j*) Educational propaganda and publicity is extremely necessary.

RECOMMENDATIONS.

1. That a sanitary inspector of this Department be sent at once to Broken Hill, where he should remain for several months. Every effort to bring about an improvement of sanitation should be made by him, so far as possible in co-operation with the local authority, but if necessary independently of it.

2. If (1) be approved (*but only in the case of approval*), special nurses should be detailed to assist in combating gastro-intestinal infections during late summer and autumn.

3. That laboratory facilities be provided (along the lines of special report) to carry out, *inter alia*, investigations concerning gastro-intestinal infections.

4. That a publicity and educational campaign be instituted at the earliest possible moment.

1925.

SECTION III.

Report upon the State Hospitals and Asylums under the Control of the Director-General of Public Health.

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SECTION III.

REPORT upon the State Hospitals under the Control of the Director-General of Public Health.

1.—THE COAST HOSPITAL, SYDNEY: REPORT FOR THE YEAR 1925

The Medical Superintendent to the Director-General of Public Health.

Sir,

I have the honor to submit the following Report on the Working of the Coast Hospital during the year 1925.

The Staff during the year has been as follows:—

Honorary Medical Staff.

Honorary Physicians.—Alfred Walter Campbell, M.B., M.S. (Edin.), M.D.; James McDonald Gill, M.D. (Lond.), L.R.C.P. (Lond.), M.R.C.S. (Eng.); Hazlett Hamilton Marshall, L.R.C.P.S, (Edin.), L.F.P.S. (Glas.), M.B., M.S. (Edin.); Alan Worsley Holmes àCourt, M.D. (Syd.) M.R.C.P. (Lond.), Medaille d'Epidemies.

Honorary Surgeons.—Charles Percy Barlee Clubbe, L.R.C.P. (Lond.), M.R.C.S. (Eng.); George Henry Abbott, M.B., Ch.M. (Syd.); Sir Alexander MacCormick, M.B., M.S., M.D. (Edin.), M.H.F.R.C.S. (Eng.), H.F.R.C.S. (Edin.); John Colvin Storey, M.B., Ch.M. (Syd.), F.R.C.S. (Eng.); Edward Thomas Thring, F.R.C.S. (Eng.), L.R.C.P. (Lond.); Harry Cecil Rutherford Darling, M.D. (Lond.), F.R.C.S. (Eng.).; Earle Christian Grafton Page, M.B. (Syd.); Thomas Maynard Furber, M.B. (Syd.).

Honorary Gynæcologists.—Joseph Foreman, L.S.A. (Lond.), L.M.R.C.P. (Edin.), M.R.C.S. (Eng.); Ralph Worrall, M.D., M.S. (Ire.).

Honorary Ophthalmic Surgeons.—Charles Gordon McLeod, M.B., M.S. (Edin.); Albert Tange Dunlop, M.B., M.S. (Syd.).

Honorary Ear, Nose, and Throat.—Herbert Huff Johnston, M.B. (Syd.).

Honorary Dermatologist.—Wahab McMurray, M.D., M.S. (Ire.).

Honorary Urologist.—Robert Joseph Silverton, M.B., M.S. (Syd.).

Honorary Radiographer.—Malcolm Frizell, M.B. (Syd.).

Honorary Orthopædic Surgeon.—Edmund Bruce Mortimer Vance, M.B. M.S.

Resident Medical Staff.

Medical Superintendent.—Reginald Jeffery Millard, M.B., Ch.M. (Syd.), D.P.H. (Camb.), C.M.G., C.B.E.

Deputy Medical Superintendent.—Henri Victor David Baret, B.A., M.B.

Senior Assistant Medical Officers.—Robert Maxwell McMaster, M.B., M.S. (Syd.), D.S.O.; Cecil Valentine Roper, M.B., Ch.M. (Syd.); Angus Johnston Murray, M.B., Ch.M. (Syd.).

Junior Medical Officers—6.

Manager.—Mr. R. Goldrick.

Matron.—Miss Alice Watson.

Sub-Matron—Miss C. M. Burne.

Dispenser.—Miss E. M. Kirton.

Clerk and Storekeeper.—Mr. W. Dwyer.

Sisters—14.

Nurses—176.

Other Female Staff—48.

Attendants (Ward)—14.

Other Male Staff—45.

STATISTICS.

Detailed tables of statistics will be found in the Appendix, but I may summarise here the more important of these.

I.—The following table is a comparative general statement for 1925 and the previous year:—

	1924.	1925.
Remaining in Hospital on 31st December	477	579
Admitted during the year	8,171	8,458
Total cases under treatment during the year	8,667	8,935
Discharges, including deaths	8,190	8,356
Deaths	435	536
Death-rate per cent. of total discharges	5·31	6·41
Average daily number of occupied beds	575·29	578·06
Average stay of patients (in days)	24·35	23·61

For the year the number of admissions was 287 more than in 1924, and the average daily number of occupied beds was 578·06, as against 575·29 in 1924. The average stay of patients was 23·61 days.

II. *Infectious Diseases.*—The following table summarises the work of the year in regard to these, and affords a comparison with 1924. In this table the "cases" are cases treated until discharge or death, and the fatality is reckoned on the total cases treated. Cases remaining in hospital on 31st December, 1925, are not included in these figures for the year:—

	1924.			1925.		
	Cases.	Deaths.	Fatality.	Cases.	Deaths.	Fatality.
Typhoid Fever	58	4	6·8	53	4	7·5
Measles	83	...	...	256	11	4·2
Scarlet Fever	1,045	9	·8	893	12	1·3
Whooping-cough	32	7	21·8	99	11	11·1
Diphtheria	1,115	16	1·4	828	3	·3
Influenza	152	1	·6	100	...	...
Erysipelas	111	4	3·6	98	4	4·08
Other Epidemic Diseases	103	4	3·8	43	3	6·9

Typhoid Fever.—The number of cases under treatment was less than in 1924; the fatality was higher.

Scarlet Fever.—Was less prevalent than in 1924—1,916 cases being notified in the whole metropolitan area during 1925 as against 2,241 during 1924, and the cases treated at the Coast Hospital showed a corresponding decrease. There were 12 deaths.

Diphtheria.—In the Metropolis the cases notified amounted to 1,626 in 1925 as against 2,115 in 1924; and the cases treated at the Coast Hospital were 828 as against 1,115 in 1924. The percentage of notified cases which came to this hospital for treatment was—in 1924, 52·7 per cent.; and in 1925, 50·9 per cent. Of the 3 fatal cases, 2 died within seven days of admission. Intubation was performed on 10 patients and tracheotomy on 6.

Anti-toxin was administered in the hospital to 827 cases in the doses shown in the following table:—

Anti-toxin.	Cases.	Percentage of Total Cases.	Anti-toxin.	Cases.	Percentage of Total Cases.
2,000 units	8	·96	34,000 units	...	...
4,000 ,,	50	6·04	36,000 ,,	...	...
6,000 ,,	123	14·87	38,000 ,,	1	·12
8,000 ,,	198	23·9	40,000 ,,	1	·12
10,000 ,,	149	18·04	42,000 ,,	...	...
12,000 ,,	136	16·44	44,000 ,,	...	...
14,000 ,,	9	1·09	46,000 ,,	...	...
16,000 ,,	59	7·13	48,000 ,,	1	·12
18,000 ,,	12	1·45	50,000 ,,	1	·12
20,000 ,,	47	5·68	52,000 ,,	2	2·4
22,000 ,,	4	·48	60,000 ,,	2	2·4
24,000 ,,	4	·48	70,000 ,,	...	...
26,000 ,,	4	·48	74,000 ,,	...	...
28,000 ,,	5	·6	80,000 ,,	...	...
30,000 ,,	10	1·21	90,000 ,,	...	...
32,000 ,,	1	·12	110,000 ,,	...	...

Altogether 2,233 cases of typhoid fever, measles, scarlet fever, diphtheria, influenza, meningitis, and whooping cough were treated. In the Appendix will be found some further details of these cases, viz.:—

Table III.—Age and sex distribution of cases discharged or died during the year.

Table IV.—Number of cases of diphtheria, scarlet fever, and typhoid notified within the Metropolis, and the percentage of these cases treated at the Coast Hospital in each of the years 1898–1925, inclusive.

Table V.—Duration of stay in hospital of cases of typhoid fever, measles, scarlet fever, whooping cough, and diphtheria.

Table VI.—Fortnightly admissions of all patients during 1925.

Table VII.—Classification of diseases treated during 1925.

Table VIII.—Operations performed during 1925.

Table IX.—Summary table showing the work of the Coast Hospital and its cost each year from 1884 to 1925.

Abortion.—During the year 497 patients were treated for abortion. The admissions for this condition have increased of late years at a startling rate, as indicated by the following figures, which show the ratio of abortion cases to all cases treated in successive years 1919–1925 inclusive:—

Year.	Total patients treated.	Abortions.	Percentage.	Year.	Total patients treated.	Abortions.	Percentage.
1919	5,941	54	0·91	1923	8,769	381	4.34
1920	6,313	193	3·06	1924	8,667	436	5.03
1921	6,952	237	3·41	1925	8,935	497	5.56
1922	7,339	354	4·82				

I think it may be taken for granted that in the great majority of these cases, if not in all, the abortion had been artificially produced. The patients were sent to hospital on account of a rise of temperature which raised alarm of sepsis. Of the 497 under treatment in 1925, seven died from this cause; the others recovered. The situation has thus been created that the hospital acts as an accessory or cover to the abortionist by admitting and curing any of his victims who show signs of going wrong after the operation. This is certainly an improper role to be forced on a Government institution, but so far no remedy has been found. Meanwhile the practice of abortion must be increasing enormously in the metropolis, as the patients who seek admission to hospital are probably only a small proportion of those on whom the criminal operation is performed.

3. *Expenditure.*—Table IX gives a detailed statement of the working expenses for 1924 and 1925, from which it will be seen that the total expenditure decreased from £88,051 14s. in 1924 to £82,932 10s. 1d. in 1925, and the average cost per occupied bed decreased from £153 1s. 1d. to £143 9s. 2d.

4. *Nursing.*—Miss Watson continued as Matron. Instruction by lectures and demonstrations was, as usual, given to the Nurses by the Medical Staff and Matron; and in invalid cookery by a specially engaged teacher (Miss Shepherd), as in former years. Examinations were held in accordance with regulations, and nurses passed as follows:—

First-year examination	40
Second-year ,, ...	41
Third-year ,, ...	33
Fourth-year ,, ...	34

During the year 30 certificated nurses left the hospital to take up private nursing, and to take positions in other hospitals. In addition to these, 8 Coast Hospital nurses passed the A.T.N.A. Obstetric Examination, after having the necessary training at Montrose Hospital.

Sick leave was granted to 105 nurses, amounting in the aggregate to 2,074 days. Of these nurses, some were ill on more than one occasion, there being 161 cases of illness altogether. Of the sick nurses 5 had diphtheria, 95 days; 13 had scarlet fever, 465 days. All the nurses recovered satisfactorily.

5. *Laboratory.*—The following Table summarises the work done in the hospital laboratory month by month. In all, 10,064 diphtheria cultures were examined. The practice was continued of accepting no diphtheria culture as negative unless found so after forty-eight hours' incubation.

1925.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Cultures examined for diphtheria—													
1. After 12–24 hours' incubation	716	705	1,092	852	906	1,003	1,027	907	813	688	712	643	10,064
2. Negative after 12–24 hours' incubation, and re-examined after 48 hours ...	519	508	659	591	639	699	787	665	642	463	562	517	7,251
3. Positive for diphtheria at second examination	50	77	76	41	57	37	64	66	65	20	31	37	621
4. Percentage of positives in second examination	9·6	15·1	11·5	6·9	8·9	5·2	8·1	9·9	10·1	4·3	5·5	7·1	8·5
Blood—Full counts	11	16	22	15	17	11	14	13	19	24	20	15	197
Leucocyte counts ...	18	12	26	19	18	25	37	27	44	40	40	36	342
Parasites, &c.	...	3	...	1	...	3	5	3	4	2	1	3	25
Cultures	...	1	3	1	6	5	7	1	4	7	4	7	46
Widals	7	15	10	11	6	27	25	22	25	17	21	27	213
Fluids—Cerebro-spinal	1	6	6	1	1	3	5	10	3	10	9	5	60
Body fluids	13	3	2	1	...	9	5	8	15	3	11	8	78
Fæces	...	2	...	...	...	...	2	1	2	2	...	3	12
Pus—For organisms, &c. ...	9	4	8	6	12	7	17	15	3	16	12	10	119
Smears—Gonococci	80	73	75	64	61	64	68	62	73	61	104	74	859
Leprosy	2	...	3	2	1	...	1	1	1	1	4	3	19
Diphtheria and Vincent's Angina ...	2	2	7	2	3	4	4	8	5	4	5	3	49
Sp. pallidum	12	15	17	13	9	6	6	9	4	10	11	15	127
Hairs and Scales for fungi ...	...	...	1	1	...	...	3	...	...	...	...	1	6
Sputum for T.B.	65	79	114	76	64	64	106	125	119	97	104	55	1,068
Urines—Bacteriological	2	1	3	4	3	1	2	2	3	2	1	4	28
Bacteriological and pus, &c.	43	12	27	32	29	46	25	38	26	46	54	43	421
Deposits only.........	16	16	24	4	14	13	14	7	24	7	2	11	152
Chemical	13	15	18	25	20	31	17	32	15	14	41	33	274
Vaccines prepared	2	4	11	5	10	6	4	7	13	5	3	15	85
Blood—Sugar	...	48	62	121	47	28	1	16	46	55	30	26	480
Typing for transfusion	...	...	...	...	2	6	2	2	...	15	6	4	37
Totals	1,531	1,540	2,190	1,847	1,868	2,061	2,184	1,981	1,903	1,589	1,757	1,561	22,012

(1) *Improvements.*—Hot water service operating theatre; alterations and repairs to lecture hall; heater and hot water service, Ward XIV; installing two steam sinks and ten steam sterilisers; sterilizing rooms, Wards XII and XIV; providing five cupboards at new units; motor garage accommodation; ventilation feed room at dairy; removal and re-erection of huts; surface drainage, Wards XIII, XIV and XV; new footpath at nurses' quarters, La Perouse; kerbing, terracing and fencing lagoon; laundry area storm water service; Infectious Division roads.

(2) *Additions.*—Drinking fountain at entrance gates; excavation for addition to laboratory; making three new hot-air baths; making double gates at laundry; erecting park rail fencing road, Infectious Division.

(3) *Alterations and Repairs.*—Shelter shed, Infectious Division; matron's, foreman's and junior medical officers' quarters; street lighting services; painting horse ambulance and other vehicles; internal painting, laundry block and other buildings, wards, furniture, fences, &c.

(4) General improvement of gardens, lawns, &c., and repair of roads.

I have, etc.,
R. J. MILLARD,
Medical Superintendent.

R. Goldrick,
Manager.

Table I.—General Statement of the working of the Hospital from 1st January to 31st December, 1925.

	Males.	Females.	Total.
Number of beds available in the General Division on 31st December, 1925...	202	200	402
,, ,, Infectious Division	......	......	311
,, ,, Nurses' Sick Room	......	4	4
Total accommodation	......	......	717
Number of inmates remaining in hospital on 31st December, 1924...	246	231	477
,, admitted during the year 1925	3,856	4,602	8,458
Total treated	4,102	4,833	8,935
Discharged—Cured	2,152	3,271	5,423
,, Relieved	1,177	878	2,055
,, Unrelieved	121	102	223
,, No Disease	58	61	119
Died	292	244	536
Total number discharged, or who died	3,800	4,556	8,356
Remaining in hospital on 31st December, 1925	302	277	579

Average daily number resident	578 06
Average residence of discharged patients in days	23 61
Rate of mortality on total number who were discharged or who died	6·4
Total cost of maintenance and treatment of indoor patients	£82,932 10s. 1d.
Average cost of patients per annum	£143 9s. 2d.

	Males.	Females.	Total.	Total Visits.
Out-patients— Total number of individuals who received treatment...	1,893	2,770	4,663	10,152
Total cost of Out-patient treatment	....	....	£969	

Hospital Staff on 31st December, 1925.

Medical and Administrative.	Number.	Nursing.	Number.	General.	Number.
Medical Superintendent	1	Sub-Matron	1	Foreman	1
Deputy Medical Superintendent	1	Asst. Sub-Matron	1	Artisans	8
Assistant Medical Officers	9	Sisters—		Attendants, Outdoor	6
Manager	1	Senior	7	,,	14
Matron	1	Junior	6	Telephone Attendants	4
Dispensers	3	Nurses—		Male Cooks	4
Clerks	7	Staff	18	Female Cooks	6
Laboratory Assistants	2	Pupil	158	,, Servants	27
X-Ray Assistant	1	Ward Attendants	14	Laundresses	11
Total	26	Housekeeper	1	Needlewomen	2
			206		83
				Total Staff	315

TABLE II.—Return showing the number of Wards, together with the cubic space and number of beds in each Ward, in the General and Infectious Divisions of the Coast Hospital for the year 1925:

Ward.	Cubic Space.	No. of Beds.	Cubic space per Bed in Ward.	Ward.	Cubic Space.	No. of Beds.	Cubic space per Bed in Ward.
1	32,100	48	668	16	11,520	13	886
3	12,000	10	1,200	17	16,915	30	564
4	12,900	11	1,173	18 and verandah	53,062	50	1,263
5 and gallery	31,368	25	1,254	19 and verandah	53,062	50	1,263
6	10,800	8	1,350	20 and verandah	53,062	50	1,263
7	10,800	8	1,350	21 and verandah	53,062	50	1,263
8 and gallery	32,268	24	1,344	23 and verandah	53,062	50	1,263
9	12,000	8	1,500	24	19,023	25	761
10 and N. Sick Room	16,356	14	1,168	25	19,023	25	761
11	22,320	26	858	26	19,023	25	761
12	23,880	28	853	27	19,023	25	761
13	28,236	41	688				
14	43,520	43	1,012	Total	686,681	717	
15	28,296	30	943				

TABLE III.—Discharges and Deaths during 1925, distributed under sex and age.

Age.	0–5		6–10		11–15		16–20		21–30		31–40		41–50		51–60		61–70		71–80		81–90		Total sexes.		Total cases treated	Total deaths.	Mortality per cent.
Sex.	M	F.	M	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Male.	Female.			
1. *Infectious Diseases*—																											
Typhoid Fever—																											
Discharges	3	2	2	2	2	3	3	3	8	8	3	5	1	2	1	1	...	...	...	...	...	...	23	26	53	4	7·5
Deaths	...	...	...	...	...	...	1	...	1	...	...	...	1	...	...	1	...	...	...	...	...	...	3	1			
Measles—																											
Discharges	74	56	18	32	2	8	7	5	11	20	1	8	1	1	...	1	...	...	...	...	...	...	114	131	256	11	4·3
Deaths	5	4	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	6			
Scarlet Fever—																											
Discharges	96	100	104	201	33	109	31	38	32	88	9	33	3	2	...	...	2	...	...	...	...	...	310	571	893	12	1·3
Deaths	3	5	...	1	...	...	...	...	...	1	...	2	...	...	...	...	...	...	...	...	...	...	3	9			
Whooping Cough—																											
Discharges	33	38	6	8	...	...	1	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	40	48	99	11	11·1
Deaths	2	6	2	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	4	7			
Diphtheria—																											
Discharges	221	248	100	108	23	30	8	9	16	30	6	20	2	3	...	...	...	1	...	...	...	...	376	449	828	3	3·6
Deaths	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2			
Influenza—																											
Discharges	2	...	1	1	1	3	5	3	8	27	6	9	7	7	5	5	1	8	...	1	...	...	36	64	100	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
Plague—																											
Discharges	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Deaths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...			
Cerebro-spinal Meningitis—																											
Discharges	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2	...	4	2	50
Deaths	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1			
2. *Other Diseases*—																											
Discharges	241	306	105	133	96	171	266	336	616	1,008	531	537	319	208	223	199	157	91	49	30	4	4	2,607	3,023	6,123	493	8·0
Deaths	20	19	5	5	4	3	12	7	19	36	39	49	53	30	59	39	49	20	15	8	...	2	275	218			
Totals	701	786	343	493	162	327	335	402	711	1,219	596	665	387	253	288	246	209	120	64	39	4	6	3,800	4,556	8,356	536	...

TABLE IV.—Showing Number of Cases of Diphtheria, Scarlet Fever, and Typhoid Fever notified within the Metropolis, and the percentage of these cases treated at the Coast Hospital, in each of the years 1900-1924 and 1925 inclusive.

	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Diphtheria.													
Cases notified in Metropolis...	278	439	393	690	738	695	659	659	880	1,144	2,109	1,834	2,632
Cases treated at Coast Hospital..................	7	65	64	92	301	313	267	389	360	500	909	974	1,284
Percentage	2·51	14·8	16·3	13·33	40·8	45·03	40·51	59·03	40·91	43·7	43·10	53·10	48·7
Scarlet Fever.													
Cases notified in Metropolis...	464	8[illegible]4	1,253	2,910	1,361	1,136	1,869	976	1,153	836	394	369	304
Cases treated at Coast Hospital..................	116	150	313	585	371	284	593	336	420	339	150	134	108
Percentage	25·00	16·96	24·98	20·10	27·26	25·00	27·45	34·43	36·43	40·55	38·07	36·31	35·5
Typhoid Fever.													
Cases notified in Metropolis...	983	829	610	833	665	561	485	505	678	700	812	488	535
Cases treated at Coast Hospital..................	247	214	144	166	178	139	84	101	118	96	85	66	67
Percentage	25·12	25·81	23·6	19·93	26·77	24·77	17·32	20	17·4	13·71	10·46	13·52	12·5

	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.
Diphtheria.													
Cases notified in Metropolis...	2,045	2,244	2,551	2,829	2,576	2,399	988	1,825	2,916	1,807	1,722	2,115	1,626
Cases treated at Coast Hospital.	994	1,057	940	1,149	1,259	1,241	501	834	1,360	905	854	1,115	787
Percentage..........................	48·6	47·10	36·85	40·6	48·8	51·7	50·72	45·6	46·6	50·00	49·5	52·7	48·4
Scarlet Fever.													
Cases notified in Metropolis...	555	1,801	4,726	2,715	1,217	765	424	468	511	653	1,511	2,241	1,916
Cases treated at Coast Hospital.	287	715	1,224	968	564	333	174	167	174	229	622	1,045	842
Percentage..........................	51·71	39·7	25·9	35·7	46·3	43·5	41·04	35·6	34	35·0	40·4	46·6	43·9
Typhoid Fever.													
Cases notified in Metropolis	566	644	821	654	403	327	335	366	342	246	265	242	230
Cases treated at Coast Hospital.	77	81	104	79	21	41	20	56	49	33	51	58	50
Percentage..........................	13·78	12·58	12·67	12·0	5·2	12·5	5·97	15·3	14·3	13·4	19·2	23·9	21·7

TABLE V.—Duration of Stay in Hospital of cases of Typhoid Fever, Measles, Scarlet Fever, Whooping Cough, and Diphtheria.

Duration of Stay.	Typhoid Fever.			Measles.			Scarlet Fever.			Whooping Cough.			Diphtheria.		
	Cured.	Died.	Total.	Cured.	Died.	Total.	Cured.	Died.	Total.	Cured.	Died.	Total.	Cured.	Died.	Total.
1 week or less	...	...	...	15	5	20	4	5	9	14	5	19	10	2	12
1— 2 weeks..	...	2	2	163	3	166	16	3	19	13	1	14	96	1	97
2— 3 ,, ...	1	2	3	34	1	35	32	2	34	13	2	15	186	...	186
3— 4 ,, ...	5	...	5	14	1	15	27	1	28	17	1	18	177	...	177
4— 5 ,, ...	8	...	8	10	1	11	402	...	402	11	...	11	134	...	134
5— 6 ,, ...	5	...	5	4	...	4	319	1	320	6	...	6	73	...	73
6— 7 ,, ...	7	...	7	2	...	2	26	...	26	2	...	2	63	...	63
7— 8 ,, ...	7	...	7	...	...	...	17	...	17	4	...	4	30	...	30
8— 9 ,, ...	8	...	8	1	...	1	14	...	14	3	1	4	19	...	19
9—10 ,, ...	3	...	3	1	...	1	10	...	10	1	...	1	13	...	13
10—11 ,, ...	2	...	2	...	...	...	4	...	4	1	1	2	4	...	4
11—12 ,, ...	2	...	2	...	...	...	2	...	2	1	...	1	7	...	7
12—13 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4
13—14 ,, ...	...	...	...	...	...	...	...	...	...	1	...	1	2	...	2
14—15 ,, ...	...	...	...	...	...	...	...	...	...	1	...	1	2	...	2
15—16 ,, ...	1	...	1	1	...	1	2	...	2	...	...	...	1	...	1
16—17 ,, ...	...	...	...	...	...	...	2	...	2	...	...	...	1	...	1
17—18 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
18—19 ,, ...	...	...	...	...	...	...	3	...	3	...	...	...	...	...	...
19—20 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
20—21 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21—22 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
22—23 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23—24 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24—25 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25—26 ,, ...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...
26—27 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27—28 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28—29 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
29—30 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30—31 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31—32 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32—33 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Over 33 ,, ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	49	4	53	245	11	256	881	12	893	88	11	99	825	3	828

TABLE VI.—Fortnightly Admission of cases during 1925.

	Fortnight ending—																										
	Jan.		Feb.		March.		April.		May.		June.			July.		Aug.		Sept.		Oct.		Nov.		Dec.			Total.
	14	28	11	25	11	25	8	22	6	20	3	17	1	15	29	12	26	9	23	7	21	4	18	2	16	31	
Typhoid Fever	...	1	1	8	3	1	5	3	2	3	4	1	..	2	4	1	2	1	...	1	1	1	2	1	2	...	50
Measles	7	25	11	12	14	3	2	12	1	11	11	12	10	20	15	21	17	19	15	1	3	1	2	1	4	2	252
Scarlet Fever	10	21	23	38	23	31	24	34	31	38	42	37	33	39	45	41	31	42	40	36	39	31	52	26	21	14	842
Whooping Cough	2	3	7	11	5	9	11	8	5	7	5	3	...	3	2	...	...	...	...	4	2	1	...	1	...	...	89
Diphtheria	15	21	23	29	27	31	33	32	35	42	39	44	37	41	43	47	43	35	38	31	22	15	13	15	14	22	787
Influenza	2	1	2	2	1	3	1	3	3	5	4	11	9	9	7	12	10	3		1	...	...	1	...	1	3	94
Other Diseases	283	271	248	246	259	239	215	259	201	208	249	244	251	252	251	210	249	272	255	261	231	252	254	243	246	195	6,344
Total..............................	319	343	315	346	332	317	291	351	278	314	354	352	340	366	367	332	352	372	348	335	298	301	324	287	288	236	8,458

Table VII.—Return of the Number of Persons under Treatment, the Order of Disease for which they were treated, and the Number of Deaths in each Order during the year 1925. (Includes cases remaining in Hospital on 31st December, 1925.)

	Discharged during the year.				Remaining in on 31st December, 1925.	Total.	Average number of days in Hospital.
	Cured.	Relieved.	Un-relieved.	Died.			
Class 1.—General Diseases.							
Typhoid Fever	49	...	...	4	...	53	46·0
Malaria	4	4	...	...	...	8	16·0
Measles	244	1	...	11	24	280	14·2
Scarlet Fever	881	...	...	12	110	1,003	38·7
Whooping-cough	84	4	...	11	8	107	25·4
Diphtheria	819	6	...	3	37	865	28·9
Influenza	100	...	...	...	21	121	12·5
Mumps	7	1	...	1	...	9	14·1
Dysentery	...	3	...	...	...	3	33·6
Erysipelas	94	...	...	4	1	99	15·6
Other Epidemic Diseases	28	2	...	...	4	34	16·9
Purulent Infection and Septicæmia	2	1	1	9	...	13	28·4
Anthrax	2	...	...	...	...	2	10·0
Tetanus	3	...	...	2	...	5	21·0
Rickets	...	...	...	...	...	...	...
Lethargica	1	1	...	1	...	3	24·6
Tuberculosis of the Lungs	...	47	17	8	11	83	57·3
,, Acute Miliary	...	...	1	2	...	3	42·1
,, Meningitis	...	4	3	...	...	7	12·7
,, Pott's Disease	...	...	1	1	3	5	303·0
,, Hips	2	13	...	2	3	20	171·8
,, Other	2	10	2	2	...	16	34·3
Poliomyelitis...	...	2	1	...	...	3	30·3
Syphilis—Primary	...	53	2	...	5	60	22·8
,, Secondary	...	29	3	...	5	37	
,, Tertiary	...	25	1	...	3	29	
, Cerebral and other Diseases	3	10	...	...	4	17	
,, II 2, III 9	...	...	...	...	...	...	
Soft Chancre	7	28	...	...	5	40	23·4
Gonorrhœal Disease	8	438	6	...	33	485	20·4
Cancer, &c., of the Mouth	8	10	12	2	...	32	21·6
,, of the Stomach and Liver	14	6	16	15	2	53	19·1
,, of the Peritonæum, Intestines, and Rectum	1	11	2	5	...	19	38·7
,, of the Female Genital Organs	3	13	5	4	...	25	10·9
,, of the Breast	15	2	1	2	2	22	51·2
,, of the Skin	24	3	2	...	...	29	19·5
,, of other Organs	9	6	3	22	1	41	28·3
Tumours	14	5	1	1	2	23	11·6
Acute Rheumatism	46	24	2	1	20	93	43·8
Chronic Rheumatism and Gout	12	50	6	...	6	74	67·
Diabetes	1	79	7	22	18	127	52·4
Exophthalmic Goitre	2	6	2	2	...	12	51·3
Hodgkin's Disease	...	...	...	1	...	1	211·0
Anæmia, Chlorosis	1	16	...	4	...	21	36·4
Leprosy	...	...	1	...	...	1	9·0
Alcoholism, Acute and Chronic	...	12	...	1	4	17	7·8
Other Chronic Poisoning and Lead	13	1	1	...	...	15	10·5
Other General Diseases	22	1	...	11	12	46	109·7
Diseases of Spleen	3	2	...	...	...	5	74·0
Addison's Disease	...	...	...	1	...	1	46·0
Diseases of Pituitary Glands	...	...	...	...	1	1	....
Total, Class 1	2,528	929	99	167	345	4,068	...
Class 2.—Diseases of the Nervous System and of the Organs of Special Sense.							
Meningitis	2	...	...	2	...	4	5·4
Cerebro-spinal Meningitis	...	1	...	4	...	5	46·5
Other Diseases of the Spinal Cord	1	4	4	...	1	10	55·5
Cerebral Hæmorrhage	...	18	...	29	2	49	24·1
Paralysis without indicated cause	...	1	2	1	...	4	37·3
Other forms of Mental Alienation	...	...	7	...	...	7	7·4
Epilepsy	1	6	...	...	...	7	23·5
Chorea	11	5	1	...	...	17	40·1
Locomotor Ataxia	...	6	...	2	...	8	21·5
Neuralgia and Neuritis	22	42	...	...	2	66	20·5
Other Diseases of the Nervous System	12	39	9	11	6	77	16·3
Diseases of the Eye and Adnexa	12	2	...	...	...	14	9·8
Diseases of the Ear	19	3	2	3	4	31	19·2
Encephalitis	...	1	...	2	...	3	17·4
Cerebral Embolism and Thrombosis	1	3	...	5	...	9	22·4
Infantile Convulsions under 5	1	...	...	...	...	1	4·
Total, Class 2	82	131	25	59	15	312	...
Class 3.—Diseases of the Circulatory System.							
Angina Pectoris	...	2	...	...	...	2	16·5
Acute Endocarditis	1	9	...	8	...	18	26·7
Organic Diseases of the Heart	4	143	4	59	15	225	36·
Diseases of the Arteries, Atheroma, &c.	...	...	...	1	...	1	41·
Embolism and Thrombosis	3	...	...	...	...	3	40·6
Diseases of the Veins (Varices, Ulcer, and Hæmorrhoids)...	77	20	2	...	8	107	34·8
Diseases of the Lymphatic System	13	7	1	...	...	21	28·2
Hæmorrhage	...	...	...	...	...	...	...
Pericarditis	...	1	...	2	...	3	49·
Aneurism	...	4	...	2	...	6	52·2
Arteriosclerosis	...	14	4	...	...	18	27·6
Other Diseases—Circulatory System	3	...	...	...	2	5	7·5
Total Class 3	101	200	11	72	25	409	...

TABLE VII.—Return of the Number of Persons under Treatment, &c.—*continued.*

	Discharged during the year.				Remaining in on 31st December, 1925.	Total.	Average number of days in Hospital.
	Cured.	Relieved.	Un-relieved.	Died.			
CLASS 4.—DISEASES OF THE RESPIRATORY SYSTEM.							
Diseases of the Nasal Fossæ	25	13	...	...	4	42	6·1
Diseases of the Larynx	10	1	...	...	2	13	8·3
Capillary Bronchitis	...	...	...	...	...	...	...
Acute Bronchitis	66	7	...	...	...	73	27·6
Chronic Bronchitis	15	41	1	2	3	62	17·8
Broncho-Pneumonia	24	...	...	13	...	37	15·3
Pneumonia	165	4	1	59	14	243	20·0
Pleurisy	60	21	3	1	3	88	52·5
Asthma	5	19	1	...	4	29	12·7
Other Diseases of the Respiratory System	6	18	...	3	...	27	21·6
Congestion and Gangrene of Lung	...	...	...	...	...	...	...
Bronchitis, Unspecified	3	...	...	...	...	3	37·6
Total, Class 4	379	124	6	78	30	617	...
CLASS 5.—DISEASES OF THE DIGESTIVE SYSTEM.							
Gastritis	26	13	...	...	5	44	13·3
Diseases of the Teeth and Gums	...	...	...	...	...	...	...
Diseases of the Mouth and its Associated Organs	16	3	...	1	2	22	10·8
Diseases of the Pharynx	366	8	2	1	7	384	9·6
Ulcer of the Stomach	13	21	1	3	13	51	24·5
Other Diseases of the Stomach (Cancer excluded)	10	19	...	...	1	30	22·5
Diarrhœa and Enteritis (children under two years only)	8	2	...	2	...	12	15·6
Diarrhœa and Enteritis (children over two years and adults)	38	2	...	1	...	41	7·7
Appendicitis	266	21	1	11	23	322	16·7
Hernia, Intestinal Obstruction	93	4	11	6	7	121	25·3
Other Diseases of the Intestines	59	36	2	3	14	114	24·1
Diseases of the Anus and Fæcal Fistulæ	1	...	1	1	...	3	16·4
Cirrhosis of the Liver	6	10	3	7	...	26	34·7
Biliary Calculi	27	16	4	3	2	52	29·7
Other Diseases of the Liver	22	12	...	3	3	40	23·5
Simple Peritonitis (non-puerperal)	5	13	6	...	...	24	16·9
Hydatid undefined	...	...	...	...	...	...	...
Other Diseases of Digestive System	...	1	...	...	...	1	14·0
Oesophagus, Stricture of	1	...	...	...	...	1	5·0
Ulcer of Duodenum	16	17	...	2	4	39	27·1
Total, Class 5	973	198	31	44	81	1,327	...
CLASS 6.—DISEASES OF THE GENITO-URINARY SYSTEM AND ADNEXA (NON-VENEREAL).							
Acute Nephritis	3	5	...	2	...	10	31·0
Uterine Hæmorrhage	4	6	...	...	...	10	10·0
Other Diseases of the Kidneys and their Adnexa	51	42	3	4	1	101	23·4
Calculi of the Urinary Passages	20	27	4	2	1	54	15·6
Diseases of the Bladder	11	17	...	...	4	32	17·2
Other Diseases of the Urethra, Urinary Abscess, &c.	13	20	1	...	2	36	16·3
Diseases of the Prostate	21	17	3	9	3	53	37·5
Non-venereal Diseases of the Male Genital Organs	19	8	1	...	5	33	22·0
Salpingitis and Pelvic Abscess	79	51	4	3	7	144	45·9
Uterine Tumour (non-cancerous)	13	2	1	...	2	18	27·0
Other Diseases of the Uterus	...	...	...	...	...	...	...
Cysts and other Ovarian Tumours	11	1	...	1	2	15	23·0
Other Diseases of the Female Genital Organs	49	51	10	...	1	111	17·0
Non-puerperal Diseases of the Breast (cancer excepted)	7	...	...	...	...	7	24·4
Chronic Nephritis	2	32	1	47	4	86	43·8
Total, Class 6	303	279	28	68	32	710	...
CLASS 7.—PUERPERAL CONDITIONS.							
Abortion	455	8	...	7	27	497	12·2
Ectopic Gestation	22	...	...	1	...	23	25·5
Hyperemesis	4	1	...	...	...	5	14·1
Pyelites	...	1	...	...	...	1	12·0
Hæmorrhage	1	2	...	...	...	3	5·0
Retroversion	...	1	...	...	...	1	4·0
Albuminuria	4	5	...	...	...	9	14·2
Pregnancy	23	15	3	1	2	44	5·8
Other Accidents of Labour	1	...	...	...	...	1	42·0
Puerperal Diseases of the Breast	5	1	...	...	...	6	23·2
Puerperal Septicæmia	27	...	...	15	2	44	19·4
Total, Class 7	542	34	3	24	31	634	...
CLASS 8.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.							
Gangrene	...	...	...	...	...	...	...
Phlegmon, Acute Abscess	165	15	1	7	6	194	17·0
Other Diseases of the Skin and Adnexa	69	31	1	...	...	101	23·3
Scabies	...	...	...	...	...	...	...
Furuncle	10	...	...	...	...	10	3·4
Elephantiasis	...	...	...	...	...	...	...
Total, Class 8	244	46	2	7	6	305	...

TABLE VII.—Return of the Number of Persons under Treatment, &c.—*continued.*

	Discharged during the year.				Remaining in on 31st December, 1925.	Total.	Average number of days in Hospital.
	Cured.	Relieved.	Un-relieved.	Died.			
CLASS 9.—DISEASES OF THE ORGANS OF LOCOMOTION.							
Non-tuberculous Disease of the Bones	31	31	5	5	2	74	60·0
Arthritis and other Diseases of the Joints (Tuberculosis and Rheumatism excepted)	17	9	1	1	...	28	29·1
Other Diseases of the Organs of Locomotion	35	16	3	...	...	54	15·8
Total, Class 9	83	56	9	6	2	156	...
CLASS 10.—MALFORMATIONS.							
Congenital Malformations	12	17	2	...	...	31	35·3
Total, Class 10	12	17	2	...	...	31	...
CLASS 11.—DISEASES OF EARLY INFANCY. Nil.							
CLASS 12.—OLD AGE.							
Senility	...	1	1	2	...	4	4·2
Total, Class 12	...	1	1	2	...	4	...
CLASS 13.—VIOLENCE.							
Lysol Poisoning	1	...	...	...	...	1	7·0
Scalds and Burns (other than fire)	21	...	...	...	2	23	30·5
Poisoning by Food (not ptomaine)	1	1	...	...	...	2	2·0
Bite of Snake or Insect	2	...	...	...	...	2	1·0
Firearms Accidents	1	...	...	...	1	2	2·0
Cutting Instruments	6	...	...	...	...	6	2·1
Burning by Fire	1	...	...	...	...	1	115·0
Falls	66	13	1	2	2	84	20·7
Crushings	12	3	...	...	...	15	11·5
Railways and Tramways	9	...	...	2	...	11	43·8
Injuries by Vehicles and Horses	37	9	2	3	1	52	16·1
Shock	1	...	...	...	...	1	1·0
Other Injuries	2	1	...	...	...	3	3·3
Assault	1	1	...	...	...	2	6·0
Fractures (not obtainable)	5	3	3	...	1	12	27·8
Other Acute Poisonings (except gas)	5	...	...	...	...	5	1[illegible]·3
Total, Class 13	171	31	6	7	7	222	...
CLASS 14.—ILL-DEFINED DISEASES.							
Malnutrition	1	...	...	...	...	1	7·0
Debility	4	9	...	1	1	15	7·3
Marasmus	...	...	...	1	...	1	1·0
Observation	30	...	...	...	...	30	5·6
No disease	11	...	...	...	...	11	6·1
Nurslings with mothers, no disease	62	...	...	...	4	66	15·2
Mothers with nurslings, no disease	16	...	...	...	...	16	6·1
Total, Class 14	124	9	...	2	5	140	...
SUMMARY.							
Total, Class 1.—General Diseases	2,528	929	99	167	345	4,068	...
" 2.—Diseases of the Nervous System and of the Organs of Special Sense	82	131	25	59	15	312	...
" 3.—Diseases of the Circulatory System	101	200	11	72	25	409	...
" 4.—Diseases of the Respiratory System	379	124	6	78	30	617	...
" 5.—Diseases of the Digestive Organs	973	198	31	44	81	1,327	...
" 6.—Diseases of the Genito-Urinary System and Adnexa	303	279	28	68	32	710	...
" 7.—Diseases of the Puerperal Condition	542	34	3	24	31	634	...
" 8.—Diseases of the Skin and of the Cellular Tissue	244	46	2	7	6	305	...
" 9.—Diseases of the Organs of Locomotion	83	56	9	6	2	156	...
" 10.—Malformation	12	17	2	...	...	31	...
" 11.—Infancy	...	...	...	...	...	...	...
" 12.—Old Age	...	1	1	2	...	4	...
" 13.—Violence	171	31	6	7	7	222	...
" 14.—Ill-defined Diseases	124	9	...	2	5	140	...
Grand Total	5,542	2,055	223	536	579	8,935	...

Table VIII.—Operations performed during 1925.

Note.—" Recovered " means lived for at least ten days after operation.

	Recovered.		Died.	
	Male.	Female.	Male.	Female.
1. *Alimentary.*				
Repair of hare-lip	...	2	...	...
,, cleft palate	2	...	...	...
Oesophagoscopy	2	...	...	...
Gastrostomy	2	...	1	...
Gastroenterostomy	21	5	1	...
Enteroenterostomy	1	...	...	...
Enteroptosis	...	1	...	...
Colostomy	10	9	1	2
Ruptured gastric ulcer	3	3	...	...
Ruptured duodenal ulcer	3	...	...	...
Appendicectomy	150	133	4	2
Hernia—				
Ventral	3	5	...	...
Femoral	...	3	...	...
Inguinal	62	4	...	...
Incisional	1	7	...	...
Intussusception	1	...	1	...
Cholecystotomy	11	7	...	...
Cholecystectomy	4	18	...	...
Cholecystgastrostomy	1	...	...	...
Cholecystduodenostomy	1	...	1	...
Hydatid of liver	2	3	...	...
Laparotomy	21	31	3	10
Sigmoidoscopy	1	2	...	...
Prolapse of rectum	1	...	...	...
Fissure in ano	...	3	...	...
Fistula in ano	7	3	...	...
	310	239	12	14
2. *Genito-urinary.*				
Nephrolithotomy	6	2	...	...
Nephrectomy	2	1	1	...
Nephropexy	...	2	...	...
Supra-pubic cystotomy	10	1	...	1
Cystoscopy	60	44	...	...
Prostatectomy	22	...	...	...
External urethrotomy	2	...	...	...
Internal urethrotomy	1	...	...	...
Hydrocœle	6	...	...	...
Orchidectomy	4	...	...	...
Varicocœle	1	...	...	...
Plastic on bladder and urethra	1	...	...	...
Circumcision	35	...	...	...
Urethral caruncle	...	2	...	...
	150	52	1	1
2a. *Gynæcological.*				
Curettage	...	562	...	1
Packing cervix and uterus	...	19	...	...
Dilatation of cervix	...	1	...	...
Cervical polypus	...	2	...	...
Colpotomy	...	33	...	...
External shortening	...	3	...	...
Internal shortening	...	8	...	...
Perineorrhaphy	...	4	...	...
Myomectomy	...	2	...	...
Oophorectomy	...	9	...	1
Ectopic gestation	...	17	...	...
Sub-total hysterectomy	...	19	...	...
Panhysterectomy	...	8	...	...
Trachelorrhaphy	...	4	...	...
Ventral fixation	...	2	...	...
Salpingectomy	...	21	...	1
Salpingo-oophorectomy	...	37	...	1
	...	751	...	4
3. *Cellular and Cutaneous.*				
Incision	113	53	1	...
Avulsion of nail	4	4	...	...
Skin graft	7	2	...	...
Sebaceous cyst	6	6	...	...
	130	65	1	...
4. *Osseous and Arthritic.*				
Amputation of toe	3	...	...	...
,, foot	1	3	...	...
,, leg	3	1	...	...
,, finger	1	1	...	...
,, arm	2	...	...	...
Tenotomy	17	4	...	...
Sequestrectomy	16	4	...	...
Arthrectomy	1	...	...	...
Arthrotomy	1	1	...	...
Arthroplasty	1	...	...	...
Osteotomy	12	...	...	...
Wiring fracture	2	...	...	...
Bone grafting	2	...	...	...
	62	14	...	...
5. *Respiratory.*				
Thoracotomy	18	6	...	...
Nasal polypi	3	...	...	...
Resection of nasal septum	7	6	...	...
Turbinectomy	1	1	1	...
Draining maxillary antrum	5	1	...	...
	34	14	1	...
6. *Circulatory.*				
Ligation of axillary vein	1	...	...	...
Excision of varicose veins	2	2	...	...
Hæmorrhoidectomy	19	8	...	...
	22	10	...	...
7. *Lymphatic and Glandular.*				
Tonsils and adenoids, excision of	87	121	...	1
Thyroid cyst	1	...	...	...
Thyroidectomy	1	6	1	...
Splenectomy	2	...	...	...
	91	127	1	1
8. *New Growths.*				
Carcinoma of breast	...	14	...	1
Simple neoplasm of breast	...	4	...	...
Epithelioma of lip	8	...	...	...
Carcinoma of tongue	3	...	...	...
Carcinoma of skin	6	1	...	1
Malignant tonsil	...	...	1	...
Maxillary new growth	3	1	...	...
Excision of malignant glands	5	2	2	...
Malignant of stomach	1	...	...	...
,, prostate	2	...	...	...
Carcinoma of rectum	...	3	...	...
Carcinoma coli	5	2	1	1
Papilloma of bladder	3	2	...	...
,, skin	1	2	...	...
,, tongue	1	1	...	...
,, palate	2	1	...	...
Malignant of cervix	...	2	...	...
Lipoma	1	1	...	...
	41	36	4	3
9. *Miscellaneous.*				
Examination and manipulation under anæsthetic	78	84	...	...
Tooth extraction	3	2	...	...
Trigeminal neurectomy	1	1	...	...
Lumbar puncture	15	2	1	...
Paracentesis tympani	6	7	...	...
Radical mastoid	7	1	1	...
Aural polypi	1	...	...	...
Enucleation of eye	1	...	...	...
Craniotomy	1	1	1	...
Dentigerous cyst	1	...	...	...
Salivary calculus	1	...	...	...
	115	98	3	...

TABLE VIII.—Operations performed during 1925—*continued.*

Summary of Operations.

	Recovered.		Died.		Total.
	Male.	Female.	Male.	Female.	
1. Alimentary	310	239	12	14	575
2. Genito-urinary	150	52	1	1	204
2A. Gynæcological	...	751	...	4	755
3. Cellular and cutaneous	130	65	1	...	196
4. Osseous and arthritic	62	14	...	...	76
5. Respiratory	34	14	1	...	49
6. Circulatory	22	10	...	...	32
7. Lymphatic and glandular	91	127	1	1	220
8. New growths	41	36	4	3	84
9. Miscellaneous	115	98	3	...	216
	955	1,406	23	23	2,407

Anæsthetics used.

Anæsthetics.—Kelene and ether, 1,705; open ether, 266; intrapharyngeal ether, 171; kelene, 134; intrathecal stovaine, 11; chloroform, 10; chloroform and ether, 2; novocain, 92. Total, 2,391.

STATEMENT OF WORKING EXPENSES OF THE COAST HOSPITAL FOR THE YEARS 1924-1925.

Table IX.—Maintenance and Treatment of Patients and Staff.

	1924.	Average.		1925.	Average.
	£ s. d.	£ s. d.		£ s. d.	£ s. d.
A. Salaries and Wages—					
1. Administrative	2,251 0 9			2,118 15 10	
2. Medical	4,365 6 11			4,171 17 7	
3. Clerical	2,695 3 9			2,610 1 0	
4. Dispensary	1,041 3 11			1,021 3 4	
5. Nursing	19,547 0 0			18,647 15 9	
9. Laundry	2,788 6 0			2,284 0 4	
10. Tradesmen and Mechanics	3,453 2 11			3,362 2 0	
11. Cleaning and General	9,503 11 5			9,397 0 3	
12. Farm and Garden	1,013 6 4			1,073 6 9	
	£46,658 2 0	81 2 1		44,686 2 10	77 6 3
B. Provisions—					
1. Meat	4,613 8 9			4,764 16 0	
2. Milk	1,885 5 0			1,861 16 10	
3. Butter	1,952 10 3			1,769 1 1	
5. Bread and Flour	1,523 11 10			1,551 16 5	
6. Eggs	1,420 15 8			1,692 0 4	
7. Fish, fresh	1,237 9 6			1,061 15 1	
8. Poultry	911 8 2			1,074 1 0	
9. Groceries	4,350 4 0			3,898 7 8	
10. Vegetables and Fruit	1,204 17 3			1,442 15 3	
11. Malt Liquors	0 13 9			3 5 9	
12. Ice	60 12 1			31 16 2	
13. Cream	229 19 4			288 4 2	
	£19,390 15 7	33 14 2		19,439 15 9	33 12 6
C. Drugs and Surgical Appliances—					
1. Drugs, &c.	4,873 1 5			4,605 18 9	
2. Dressings and Bandages	215 9 10			334 8 2	
3. Surgical Appliances, Renewals	337 18 5			489 3 0	
4. Surgical Instruments, Renewals	85 17 3			360 13 8	
5. Stimulants	375 2 6			327 4 1	
	£5,887 9 5	10 4 8		6,017 7 8	10 8 3
D. Fuel, Light, and Power—					
1. Coal, Coke, and Wood	3,652 2 8			3,558 2 7	
4. Electricity	3,163 15 9			1,696 15 8	
5. Electrical Fittings, Renewals	610 13 1			210 0 0	
	£7,426 11 6	12 18 2		5,464 18 3	9 9 0
E. Domestic—					
1. Bedding and Bed Linen	1,259 0 9			1,050 12 0	
2. Clothing	822 12 9			694 14 8	
3. Drapery	830 4 0			695 16 10	
4. Uniforms	492 2 6			406 5 3	
5. Renewals of Furniture	68 0 1			74 8 5	
6. Ironmongery and Cutlery, &c.	395 2 11			513 15 11	
7. Brushware, Earthenware, &c.	424 0 10			308 15 4	
8. Laundry Materials	595 10 7			659 16 8	
	£4,887 14 5	8 10 0		4,404 5 1	7 12 2
F. Printing and Stationery—					
1. Printing and Stationery	289 6 7			384 17 5	
3. Postage	91 19 3			86 10 0	
	£381 5 10	0 13 3		471 7 5	0 16 4
G. Maintenance of Buildings and Grounds—					
1. Ordinary Repairs and Alterations	512 19 0			517 9 0	
2. Roadways and Grounds	74 3 6			49 16 2	
	£587 2 6	1 0 5		567 5 2	0 19 8
J. Miscellaneous—					
1. Rates and Taxes	93 4 3			....	
2. Insurance	209 17 5			196 0 8	
3. Burials and Coffins	43 17 6			79 13 5	
4. Telephones	422 7 9			363 14 3	
7. Petty Expenses	242 1 7			256 8 7	
8. Unclassified	697 3 10			772 17 11	
	£1,708 12 4	2 19 4		1,668 14 10	2 17 10
K. Extraordinary Expenditure—					
1. Surgical Instruments	....			....	
2. Appliances	5 4 11			17 2 11	
3. Machinery	27 3 8			8 10 3	
4. New Furniture	242 15 6			263 0 0	
5. New Buildings and Additions	....			....	
6. Miscellaneous	....			....	
7. Drapery	....			....	
8. Ironmongery	....			....	
9. Brushware	....			....	
10. Bedding and Bed Linen	....			....	
11. Special Repairs	13 10 0			....	
	£288 14 1	0 10 0		288 13 2	0 10 0

TABLE IX.—Maintenance and Treatment of Patients and Staff—*continued.*

	1924.	Average.	1925.	Average.
	£ s. d.	£ s. d.	£ s. d.	£ s. d
L. Special Department—				
1. X Ray	99 5 5		179 12 6	
	99 5 5	0 3 5	179 12 6	0 6 5
M. Farm and Garden, Live Stock, &c.—				
1. Purchase of Horses and Cows	100 0 0		195 0 0	
2. Purchase of Fodder	2,147 16 9		1,459 1 2	
3. Miscellaneous	45 18 9		57 7 9	
	2,293 15 6	3 19 9	1,711 8 11	2 19 0
Total Expenditure	89,609 8 7	155 15 3	84,899 11 7	146 17 5
Add value of goods received from other Institutions	5 7 0		9 7 10	
	89,614 15 7		84,908 19 5	
Deduct value of goods supplied to other Institutions	2 16 3		17 14 3	
	89,611 19 4		84.891 5 2	
Add value of Stock on hand, 31st Dec., 1923	4,956 17 2		5,079 8 5	
	94,568 16 6		89,970 13 7	
Deduct value of Stock on hand, 31st Dec., 1924	5,079 8 5		5,510 5 4	
	89,489 8 1		84,460 8 3	
Deduct Extraordinary Expenditure, Cost of Out-door Patients, &c.	1,437 14 1		1,527 18 2	
	88,051 14 0		82,932 10 1	
Average cost per occupied bed, General and Infectious Division, based on upkeep Expenditure	....	153 1 1	....	143 9 2
Deduct Collections paid to Revenue	6,675 12 3	....	6,777 7 7	....
	81,376 1 9	....	76,155 2 6	....
Net cost per occupied bed, General and Infectious Division	....	141 9 1	....	131 14 10

TABLE X.—Amount expended from the Vote of the Public Works Department not included in the foregoing statistics.

	1924.		1925	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Roads and Footpaths—				
Repairs	327 18 9	....	18 17 10	....
Construction	....	....	....	....
Total	327 18 9	327 18 9	18 17 10	18 17 10
Fencing—				
La Perouse—House	98 0 0	....	....	....
Total	98 0 0	98 0 0	....	....
Steam and Hot Water Services—				
Repairs—Steam and Hot Water Services	34 0 2	....	434 6 1	....
Repairs and Renewals of Boilers	371 5 1	....	42 18 0	....
Hot Water Services	567 2 3	....	184 13 2	....
Rebuilding Chimney Flues	44 4 0	....	....	....
Repairs to Tank Stand	34 10 0	....	....	....
Total	1,051 1 6	1,051 1 6	661 17 3	661 17 3
Cold Storage—				
Refrigerating Plant	1 18 9	....	....	....
Total	1 18 9	1 18 9	....	....
Electric Light and Power Service—				
Electric Maintenance	134 12 0	....	....	....
Light and Power Mains	....	....	33 0 0	....
Total	134 12 0	134 12 0	33 0 0	33 0 0
General—				
Repairing Laundry Plant	78 5 0	....	....	....
Repairs and Renovations of Buildings	4,259 3 10	....	3,034 2 4	....
Cooking Plant	277 16 7	....	30 4 7	....
Repairs to Dam	99 10 8	....	....	....
Repairs—Fire Services	60 0 0	....	10 0 0	....
Erection, Herdsmans' Cottage	....	....	998 9 1	....
Repairs—Tennis Court	73 0 0	....	....	....
„ Sewerage	85 0 11	....	67 2 1	....
Repairs and Extensions Water Service	182 5 0	....	121 5 6	....
Boosting Plant	129 16 3	....	....	....
Total	5,244 18 3	5,244 18 3	4,261 3 7	4,261 3 7
X-Ray Plant—				
Electrical Appliances and X-Ray Plant	1,223 15 10	....	296 9 8	....
Testing X-Ray Apparatus	....	....	....	....
Conversion of old office into X-Ray Department	262 12 2	....	....	....
	1,486 8 0	1,486 8 0	296 9 8	296 9 8
Grand Total	....	8,344 17 3	....	5,271 8 4

TABLE XI.—SUMMARY TABLE, showing the work of the Coast Hospital and its cost each year, from 1884 to 1925.

Year.	No. of Patients admitted.	Average residence of discharged patients in days.	Rate of Mortality on cases treated.	Infectious Diseases included in foregoing columns.																				Average daily number.	Cost per occupied bed.	Wines, spirits, &c., cost per head (included in foregoing columns).
				Typhoid Fever.		Variola.		Measles.		Scarlet Fever.		Whooping Cough.		Diphtheria.		Influenza.		Plague.		Erysipelas.		Other Epidemic Diseases.				
				Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.	Admissions.	Deaths.		£ s. d.	£ s. d.
1884	1,132	29·33	4·04	235	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	104·33	58 1 1¼	2 3 2½
1885	1,204	37·06	7·05	285	50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	150·05	51 16 8	1 11 2¾
1886	1,278	41·06	9·38	392	53	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	146·33	52 0 8	1 10 0¾
1887	1,726	42·05	9·21	286	36	...	...	18	...	43	...	...	...	...	...	...	...	...	...	...	...	1	...	198·56	42 14 1½	0 10 9¼
1888	1,694	42·23	5·55	241	15	...	...	33	...	52	...	...	...	1	...	...	...	...	...	45	...	3	...	197·12	41 13 2	0 8 8
1889	1,813	39·09	5·44	342	24	...	...	10	1	21	...	36	2	7	2	...	...	...	...	52	2	2	...	198·09	44 17 4¾	0 6 4½
1890	1,529	42·00	7·03	140	21	...	...	5	...	14	...	19	...	1	...	...	...	...	...	19	...	7	...	178·00	55 7 5	0 5 11
1891	1,748	40·00	3·23	88	8	...	...	1	...	22	...	25	2	4	...	...	...	...	...	31	...	7	...	193·00	50 2 6	0 5 2¾
1892	1,644	44·06	4·04	61	10	...	...	2	...	39	...	29	2	6	3	...	...	...	...	24	...	16	...	200·03	44 17 11¼	0 7 6½
1893	2,274	32·08	4·05	83	10	...	...	281	8	195	12	7	...	9	3	...	...	...	...	36	...	7	...	193·05	47 8 0	0 10 1
1894	2,158	27·06	4·03	143	12	...	...	7	1	118	9	28	3	9	3	...	...	...	...	36	3	26	...	176·04	55 7 4¼	1 3 6¾
1895	2,451	24·06	3·07	96	6	...	...	1	...	60	...	25	1	45	1	...	...	...	...	51	...	10	...	176·03	59 1 11	1 1 6¾
1896	2,213	31·03	5·04	236	19	...	...	2	...	61	2	3	...	11	1	...	...	...	...	63	...	1	...	204·06	51 6 1¾	1 4 4
1897	2,307	32·06	5·05	128	11	...	...	...	...	235	3	...	...	25	...	...	...	...	...	100	7	6	...	224·04	50 19 2½	1 9 10
1898	2,694	31·04	5·38	163	18	...	...	319	15	350	7	...	...	27	4	...	...	...	...	70	2	...	...	231·00	64 14 10¾	1 14 3¼
1899	2,359	36·30	4·79	148	13	...	...	10	...	134	2	42	10	25	2	...	...	...	...	54	...	8	...	224·25	73 10 11¾	1 13 10
1900	2,513	30·10	5·20	247	25	...	...	29	...	116	2	2	...	7	2	...	...	...	...	33	2	4	...	214·40	72 18 8¼	1 8 2¾
1901	2,688	31·24	5·75	214	21	...	...	131	1	150	5	15	...	65	4	...	...	...	...	49	5	11	...	255·50	59 4 3½	0 16 1½
1902	2,672	30·94	6·29	144	5	...	...	73	...	313	20	26	...	64	5	...	...	128	26	109	8	6	...	256·85	66 9 4¼	0 13 10¼
1903	3,359	31·72	4·67	166	20	...	...	62	1	585	21	13	3	92	...	...	...	2	...	84	6	16	1	300·76	61 17 11¼	0 5 2¾
1904	3,439	30·94	5·17	178	24	...	...	81	1	371	11	40	4	301	11	...	...	10	4	113	5	44	...	305·16	63 2 11¼	0 7 8¼
1905	3,298	31·81	5·20	139	20	...	...	43	1	284	6	1	...	313	10	...	...	16	4	100	6	7	...	289·32	59 12 0¾	0 8 4
1906	2,965	37·03	3·56	84	7	...	...	55	...	503	11	...	...	267	9	...	...	15	4	80	4	3	...	308·67	56 13 1½	0 4 0½
1907	3,051	37·16	5·93	101	12	...	...	157	5	336	5	93	20	389	23	...	...	41	11	58	...	...	...	307·41	58 17 8¼	0 4 5¼
1908	3,147	32·89	5·44	114	13	...	...	17	1	420	10	6	1	360	11	...	...	7	2	62	7	...	...	306·83	61 11 5	0 4 0¾
1909	2,971	31·13	5·53	96	8	...	...	55	...	339	6	4	...	500	12	...	...	22	7	72	3	...	...	295·33	63 5 4½	0 4 1¾
1910	3,538	30·52	5·39	85	7	...	...	189	12	150	6	74	15	909	18	...	...	...	...	40	3	41	...	312·66	62 2 0¾	0 2 5¼
1911	3,474	29·19	5·32	66	8	...	...	70	...	134	...	67	12	974	24	...	...	...	...	48	4	...	...	322·62	64 0 1¼	0 4 0½
1912	4,170	29·54	5·76	67	8	...	...	475	46	108	4	29	5	1284	36	...	...	...	...	73	8	5	...	335·45	77 15 1½	0 4 1¾
1913	3,702	31·83	5·13	77	10	4	...	93	...	287	7	64	14	994	28	...	...	...	...	48	5	22	...	335·51	87 6 6¼	0 3 3¼
1914	4,032	32·35	3·81	73	12	6	...	82	1	628	7	36	4	977	10	...	...	...	...	34	1	20	...	373·11	74 7 5	0 1 0½
1915	4,806	30·09	4·12	123	10	22	...	357	2	1279	19	4	...	925	35	...	...	...	...	42	8	12	3	440·00	69 5 7	0 2 3½
1916	4,618	32·29	3·07	59	8	14	...	206	1	835	22	53	9	1101	32	...	...	...	...	55	1	244	...	447·00	77 4 11	0 4 1¼
1917	4,320	36·49	3·73	16	2	4	...	147	6	498	4	21	4	1328	11	...	...	...	...	79	7	207	...	433·12	94 10 9	0 4 4
1918	4,556	39·60	4·20	31	6	1	...	323	13	314	9	63	8	1251	13	...	...	...	...	92	10	38	...	513·41	98 12 2	0 4 8
1919	5,556	20·67	8·13	25	1	1	...	62	3	213	5	20	1	571	10	2,966	313	...	...	66	2	20	...	385·2	159 0 4	0 8 3
1920	5,945	29·72	7·37	61	5	...	...	581	62	212	1	130	18	904	14	83	...	...	...	86	13	44	...	477·62	159 0 0	0 5 7
1921	6,450	29·3	5·6	49	12	...	...	36	4	174	...	40	4	1360	15	215	16	1	1	102	4	52	...	522·3	156 17 8	0 7 7
1922	6,894	27·54	5·6	33	15	...	...	163	5	229	3	37	2	905	11	118	1	29	6	109	7	514	3	520·16	149 12 4	0 5 8
1923	8,289	34·38	6·37	48	5	...	...	642	35	607	3	32	5	855	13	170	3	...	...	195	12	258	...	563·47	141 10 2	0 13 2
1924	8,171	24·35	5·31	51	4	...	...	85	...	1024	9	39	7	1107	16	158	1	...	...	111	4	79	...	575·29	153 1 1	0 13 0
1925	8,458	23·61	6·41	50	4	...	...	252	11	842	12	89	11	787	3	94	...	...	...	98	4	43	... 3	578·06	143 9 2	0 11 3

2.—LEPER LAZARET.

THIRTY-FIFTH REPORT ON LEPROSY IN NEW SOUTH WALES, FOR THE YEAR ENDED 31st DECEMBER, 1925.

The Medical Superintendent of the Coast Hospital to the Director-General of Public Health.

The Coast Hospital, Sydney, N.S.W.

Sir,

On 1st January, 1925, 16 persons remained under detention at the lazaret. (*See* Appendix A.)

During the year 7 persons were reported to the Board under the Public Health Act, 1902, Part 3, as being suspected lepers, and after careful inquiry were duly certified as suffering from leprosy, and admitted to the lazaret by warrant of the Board. One patient was re-admitted.

There were 6 discharges during the year, viz., E.T.D., admitted in 1920 (Case CLV); C.E.B., admitted in 1924 (Case CLXII); E.K., admitted in 1925 (Case CLXVI); A.M., admitted in 1925 (CLXVII); A.D., admitted in 1925 (Case CLXVIII); A.C., admitted in 1925 (Case CLXV).

The total number of persons admitted since 1883, when patients first began to be received (though the notification of leprosy was first made compulsory and the detention of lepers provided for by law only towards the end of 1890), is 170.* Distributed under nationalities, the account stands as follows:—

	Admitted.	Re-admitted.	Discharged.	Repatriated.	Died.	Remaining in at 31 Dec., 1925.
Whites, of European descent—						
New South Wales	43	1	14	......	24	
Victoria	2	.....	......	......	1	1
Queensland	2	......	1	......	1	......
Northern Territory	1	......	1	......	......	......
New Zealand	1	......	......	......	1	......
Fiji	2	......	1	......	1	......
England	12	......	3	......	8	1
Ireland	8	......		......	5	1
Germany	4	......	1 absconded.	1	2	......
Belgium	1	......	......	......	1	......
U.S. America	1	......	......	......	1	......
Greece	2	......	......	1	......	1
Malta	2	......	1 absconded.	......	1	......
Sweden	1	......	......	......	......	1
France	1	......	......	......	1	......
Coloured patients—						
New South Wales	2	......	1	......	......	1
West Indies	1	.....	1 (in 1885).	......	......	......
India	4	......	1 absconded.	1	2	......
China	56	......	2	33	19	2
Java	1	......	......	......	......	1
New Caledonia	1	......	......	......	1	......
Pacific Islands	18	......	......	5	11	2
Egypt	1	......	......	1	......	......
Zanzibar	1	......	1 (to Hong Kong at own request).	......	......	......
Syria	2	......	1	1	......	......
	170	1	31	43	80	17

---

* This is the number of persons admitted; it does not agree with the highest number given in Appendix B in Roman numerals, which indicates the number of cases observed, whether admitted or merely described and recorded.

Thus the number remaining in the lazaret on 31st December, 1925, was 17 persons; 13 males and 4 females.

Appendix A shows particulars of each case under detention since the year 1883, and in Appendix B are given the usual notes of the new patients received during 1925, of patients discharged or died during the year, and a survey of the condition of patients remaining in at the end of the year.

Every opportunity has been offered to members of the medical profession to visit the lazaret fo the purpose of seeing such patients as were formerly under their care, or for study of the disease.

The following statements show the expenditure for the year, and the sources from which it has been defrayed :—

Statement showing the Working Expenses of the Lazarets (for men and for women) at Little Bay for the year 1925.

	£	s.	d.
Salaries ...	1,548	5	1
Provisions ...	797	0	7
Fruit and vegetables ...	108	0	10
Uniforms, clothing, &c. ...	232	0	4
Printing and stationery ...	4	10	0
Fuel and light ...	219	4	8
Wines, ales, &c. ...	6	6	5
Ironmongery, brushware, &c. ...	25	5	11
Drugs ...	48	1	3
Sundries ...	233	19	6
	£3,222	14	7

Average number of patients resident, 18·5, being equal to an average of £174 4s. 0d. per inmate per annum.

Statement showing the total Expenditure of the Lazarets (for men and for women) at Little Bay during the year 1925, and from what sources the amounts were paid.

Expenditure.	£ s. d.	How Paid.	£ s. d.
To working expenditure, as per statement.	3,222 14 7	From vote—Maintenance of lepers by Department of Public Health	2,258 10 11
		Transfers from Coast Hospital stock	964 3 8
Total ....£	3,222 14 7	Total .... £	3,222 14 7

The needs of the patients have been carefully supplied by experienced attendants and nurses, under direct supervision of the Medical Superintendent and the Matron of the Coast Hospital, and, as in the past, every means have been adopted to alleviate their sufferings and to mitigate the hardships of their detention.

I have, &c.,
R. J. MILLARD,
Medical Superintendent.

APPENDIX A.

RETURN showing Particulars of Lepers detained at Little Bay, New South Wales, since the year 1883.

Name.	Sex.	Native of—	Occupation.	Admission.		Where from.	No. of Case in Clinical Notes.	Died or Discharged.
				Age on	Date of			
A.H. ...	Male ...	China	Gardener	42	19 April, 1883	Parramatta Asylum	....	Died, 15 May, 1886.
J.H. ...	,, ...	,, ...	,, ...	32	19 ,, ,,	,, ...	....	Died 27 June, 1886.
A.H. ...	,, ...	,, ...	,, ...	34	12 June, ,,	,, ...	....	Died, 20 April, 1886.
A.M. ...	,, ...	,, ...	Butcher	32	28 Oct., ,,	Tenterfield	XIV	Returned to China, 14 Aug., 1896.
A.P. ...	,, ...	,, ...	Storekeeper	27	28 ,, ,,	Willow Creek	XV	
G.H. ...	,, ...	,, ...	Labourer	37	27 ,, 1884	Sydney	....	†Died, 24 Dec., 1886.
K.K. ...	,, ...	,, ...	,, ...	24	21 Dec., ,,	Bathurst	....	Died, 28 April, 1885.
J.B. ...	,, ...	West Indies ...	,, ...	51	22 Sept., 1885	Bermagui	....	‡Discharged, 29 Dec., 1885.
A.Y. ...	,, ...	China	Gardener	29	23 Dec., ,,	Sydney	....	Died, 6 Feb., 1890.
C.B. ...	,, ...	,, ...	,, ...	32	29 Jan., 1886	Alexandria	XVI	Returned to China, 14 Aug., 1896.
A.S. ...	,, ...	,, ...	Tin-miner	42	20 Feb., ,,	Cooper's Creek	....	Died, 12 Nov., 1890.
C.T. ...	,, ...	Java	Groom	24	14 Aug., ,,	Castle Hill, Parramatta.	XVII	
A.L. ..	,, ...	China	Gardener	44	20 May, 1887	Bathurst	....	Died, 12 April, 1891.
Y.S. ...	,, ...	,, ...	Carpenter	31	20 April, 1888	Sydney	XVIII	Returned to China, 14 Aug., 1896.
*F.G. ...	,, ...	N.S.W.	Plasterer	27	21 Aug., ,,	,, ...	I	Died, 25 Sept., 1892.
A.Y. ...	,, ...	China	Gardener	29	30 Sept., ,,	Inverell	XIX	Returned to China, 14 Aug , 1896.
L.P. ...	,, ...	,, ...	Carpenter	18	22 Dec., ,,	Sydney	XX	
H.K. ...	,, ...	,, ...	Miner	28	23 Mar., 1889	Enfield	XXI	
*H.B. ...	,, ...	N.S.W.	,, ...	17	17 Dec., ,,	Mudgee	II	Died, 13 May, 1894.
*H.R. ...	,, ...	,, ...	Labourer	28	8 Aug., 1890	Richmond River ...	III	Died, 29 May, 1901.
*A.G. ...	,, ...	,, ...	Schoolboy	14	18 ,, ,,	Balmain...............	IV	Discharged 1/5/95. Died 21/7/25.
*E.U. ...	,, ...	,, ...	Labourer	23	16 Jan., 1891	Sydney	V	Died, 1 May, 1898.
*H.S. ...	,, ...	,, ...	Mariner	41	23 ,, ,,	Newtown	VI	Died, 4 Feb., 1891.
A.L. ...	,, ...	China	Gardener	30	26 Feb., ,,	Newcastle	XXIII	Died, 28 Dec., 1895.
*M.R. ...	Female	N.S.W.	Domestic duties ...	33	§11 Mar., ,,	Surry Hills	VII	Died, 20 June, 1892.
T.W. ...	Male ...	China	Cook.....................	29	6 Aug., ,,	Narrandera	XXV	Returned to China, 14 Aug 1896.
W.C. ...	,, ...	,, ...	Labourer	40	27 ,, ,,	Sydney	XXIV	
A.H. ...	,, ...	,, ...	Storekeeper	25	18 Sept., ,,	Mudgee	XXII	
J.L. ...	,, ...	Tanna	Labourer	25	8 Dec., ,,	Clarence River	XXVI	Died, 7 May, 1901.
*R.W. ...	,, ...	N.S.W.	Carpenter	47	24 ,, ,,	Narrabri	VIII	Died, 27 Mar., 1896.
*I.L. ...	Female	,, ...	Domestic duties ...	53	§18 ,, ,,	Waverley	IX	Died, 16 June, 1899.
A.S. ...	Male ...	China	Cabinetmaker	28	21 April, 1892	Sydney	XXVII	Died, 29 June, 1892.
*C.D. ...	,, ...	N.S.W.	Carpenter	24	30 ,, ,,	Gunnedah............	X	Died, 17 Aug., 1900.
S.P. ...	,, ...	England.........	Commercial traveller	49	7 June, ,,	Sydney	XI	Died, 28 May, 1898.
H.G. ...	,, ...	China	Wood-cutter	47	19 Sept., ,,	,, ...	XXVIII	Returned to China, 14 Aug., 1896.
M.E.K.	Female	N.S.W.	Domestic duties ...	43	21 ,, ,,	North Sydney	XII	Died, 23 July, 1897.
L.P.H.	Male ...	China	Gardener	44	12 Oct., ,,	Manly	XXIX	Returned to China, 14 Aug., 1896.
W.W. ...	,, ...	Fiji	Schoolboy	13	27 ,, ,,	Sydney	XIII	Died, 26 Jan., 1901.
A.L. ...	,, ...	China	Gardener	35	3 Nov., ,,	Bombala	XXXI	Returned to China, 17 July, 1897
A.Q. ...	,, ...	,, ...	Dealer	39	15 ,, ,,	,, ...	XXXII	Returned to China, 14 Aug., 1896.
J.C. ...	,, ...	,, ...	....	38	29 ,, ,,	Sydney	XXXIII	Died, 2 Aug., 1893.
A.G. ...	,, ...	,, ...	Labourer	26	7 Dec., ,,	Parramatta	XXX	Returned to China, 14 Aug., 1896.
G.Y. ...	,, ...	,, ...	Cook.....................	68	21 ,, ,,	Sydney	XXXIV	
A.P. ...	,, ...	,, ...	Hawker	33	21 Jan., 1893	Parramatta	XXXV	
M.M. ...	Female	New Zealand...	....	24	27 Feb., ,,	Fiji	XXXVI	Died, 10 Sept., 1895.
A.T. ...	Male ...	China	Bushman	28	15 April, ,,	Cooma	XXXVII	Returned to China, 14 Aug., 1896.
*N.G. ...	,, ...	N.S.W.	Miner	61	21 ,, ,,	Parramatta Asylum	XXXVIII	Died, 4 April, 1896.
*A.M. ...	Female	,, ...	Housewife	35	7 Sept., ,,	Balmain	XXXIX	Died, 13 Mar., 1896.
P.M. ...	Male ...	India	Hawker	47	3 Nov., ,,	Newcastle	XL	Died, 22 Mar., 1899.
*E.R. ...	Female	N.S.W.	Domestic duties	16	18 ,, ,,	West Maitland	XLI	Died, 21 Sept., 1900.
C.H.M.	Male ...	Germany	Station overseer	65	25 Jan., 1894	Sydney	XLII	Died, 8 July, 1898.
‖W.H.D...	,, ...	Queensland ...	....	21	18 April, ,,	,, ...	XLIII	Died, 29 Nov., 1896.
G.N. ...	,, ...	New Caledonia	Pearl-diver	20	16 July, ,,	,, ...	XLIV	Died, 1 Sept., 1895.
*H.J.T....	,, ...	N.S.W.	Bushman	52	10 Oct., ,,	,, ...	XLV	Discharged, 5 Sept., 1902.
K.J. ...	,, ...	India	Hawker	30	30 Nov., ,,	,, ...	XLVI	Died, 2 Aug., 1895.
J.T. ...	,, ...	England.........	Labourer	70	4 April, 1895	Coast Hospital	XLVIII	Died, 6 Nov., 1897.
T.O'R.	,, ...	Ireland	,, ...	70	2 Oct., ,,	Sydney	LIII	Died, 8 Nov., 1895.
W.F. ...	,, ...	,, ...	Clerk	40	8 ,, ,,	,, ...	LII	Died, 8 Nov., 1896.
H.J. ...	,, ...	China	Hawker	31	21 Jan., 1896	Coast Hospital	LV	Returned to China, 14 Aug., 1896.
H.Y. ...	,, ...	,, ...	Gardener	26	4 Feb., ,,	,, ...	LIV	
A.T. ...	,, ...	,, ...	,, ...	31	25 Dec., ,,	Oxley	LVI	Returned to China, 17 July, 1897.
F.R. ...	,, ...	Belgium	Mechanic	55	16 Feb., 1897	Coast Hospital	LVIII	Died, 23 June, 1897.
H.W. ...	,, ...	U.S.A.	Mariner	57	12 Nov., ,,	Lord Howe Island. .	LIX	Died, 14 May, 1911.
*W.W. ...	,, ...	N.S.W.	Labourer	19	26 Feb., 1898	Wollongong	LXI	Died, 21 Feb., 1900.
*A.B. ...	,, ...	,, ...	,, ...	20	22 Mar., ,,	Gunnedah............	LXIV	Died, 7 July, 1901.
*R.C. ...	,, ...	,, ...	Butcher	27	9 July, ,,	Wollongong	LXII	Died, 30 April, 1903.
A.G. ...	Female	China	Housewife	38	23 Sept., ,,	Waterloo	LXVI	Died, 4 Feb., 1901.
*J.F.D. ..	Male ...	N.S.W.	Labourer	26	11 July, 1899	Lismore	LXVII	Died, 30 Mar., 1907.
C.P. ...	,, ...	China	Scullerymen	22	14 April, 1900	Sydney	LXVIII	Died, 16 May, 1903.
B.A. ...	,, ...	Aoba Island ...	Labourer	35	26 Feb., 1901	Murwillumbah	LXIX	Returned to Aoba, 1 Dec , 1902.
C.T. ...	Female	Germany	Housewife	29	23 April, ,,	Lismore	LXX	Died, 14 Dec., 1903.
*D.N. ...	Male ...	N.S.W.	Labourer	18	4 June, ,,	Glen Innes	LXXI	Died, 28 Feb., 1905.
J.S.	,, ...	,, ...	Farmer	52	20 ,, ,,	Miller's Forest	LXXII	Discharged, 28 Feb., 1902.
*D.L. ...	,, ...	England.........	Labourer	46	20 ,, ,,	Rookwood Asylum	LXXIII	Died, 15 Dec., 1902.
F.H. ..	,, ...	,, ...	Seaman	75	4 July, ,,	Sydney	LXXIV	Died, 5 July, 1905.
A.R. ...	,, ...	China	Labourer	25	30 Oct., ,,	,, ...	LXXV	Returned to Hongkong, 6 Aug., 1904.
A.T. ...	,, ...	,, ...	,, ...	35	4 Dec., ,,	,, ...	LXXVI	
G.Y. ...	,, ...	,, ...	Miner	...	8 Jan., 1902	,, ...	LXXVII	Died, 17 Jan., 1902.
*J.G. ...	,, ...	N.S.W.	Grazier..................	57	13 ,, 1903	,, ...	LXXVIII	Died, 31 Aug., 1904.
M.S. ...	,, ...	Ireland	Miner	45	20 Feb., ,,	Parramatta Asylum	LXXIX	Died, 19 Feb., 1908.
F.H.L.	,, ...	China	Gardener	32	10 Mar., ,,	Enfield	LXXX	Returned to Hongkong, 6 Aug., 1904.
G.M. ...	,, ...	England.........	Farmer	52	7 April, 1903	Cudgen	LXXXI	Discharged, 31 Mar., 1909.

* These are all natives of New South Wales of European descent. † This patient was transferred to a Hospital for the Insane on 2nd April, 1885, where also his death occurred. ‡ See note * to Appendix A. § Date of report. These patients were afterwards removed to Little Bay. ‖ Of European descent.

Patients remaining under treatment have their initials shown in black-faced type.

RETURN showing Particulars of Lepers detained at Little Bay, New South Wales, since the year 1883—*continued.*

Name.	Sex.	Native of—	Occupation.	Admission. Age on.	Admission. Date of.	Where from.	No. of Case in Clinical Notes.	Died or Discharged.
† F.C.	Male	Fiji	School	17	7 April, ,,	Fiji	LXXXII	Discharged, 29 Mar, 1918
A.S.	,,	China	Wood-cutter	31	21 ,, ,,	Canterbury	LXXXIII	Returned to Hongkong, 6 Aug., 1904.
S.V.	,,	Zanzibar	Seaman	22	5 May, ,,	Sydney	LXXXIV	
T.B.	,,	China	Cook	37	30 June, ,,	Canterbury	LXXXV	
W.M.	,,	Buka Buka	Labourer	36	3 Nov., ,,	Tweed River	LXXXVI	Died, 14th March, 1914
* F.E.B.	,,	N.S.W.	Drover	27	25 ,, ,,	,,	LXXXVII	
* G.M.S.	Female	,,	Housewife	19	9 Feb., 1904	Lismore	LXXXVIII	
* V.M.W.	,,	,,		17	31 Mar., ,,	Sydney	LXXXIX	Discharged, 11th Jan., 1915.
D.D.	Male	,,	Teamster	54	19 April, ,,	Botany	XC	Discharged, 20 Sept., 1909.
A.M.	,,	China	Farmer	24	3 May, ,,	Tumut	XCI	Returned to Hongkong, 6 Aug., 1904.
F.B.	,,	Mallicolo	Labourer	39	10 ,, ,,	Tweed River	XCII	Returned to native island, 9 May, 1908.
W.T.	,,	England		65	4 July, ,,	Sydney	XCIII	Discharged, 20 Sept., 1906.
G.W.	,,	China	Labourer	32	27 Sept., ,,	Narrabri	XCIV	Returned to Hongkong, 13 June, 1905.
* R.B.	,,	N.S.W.	Coach-painter	23	11 Oct., ,,	Newtown	XCV	Discharged, 22 March, 1912.
H.F.	,,	China	Miner	45	24 Jan., 1905	Emmaville	XCVI	Ret'd to Hongkong, 13 June, 1905.
S.M.	,,	Lifu	Labourer	66	7 Feb., ,,	Tweed River	XCVII	Died, 8 Jan., 1907.
A.S.	Female	Egypt	Housewife	38	7 Mar, ,,	Sydney	XCVIII	Returned to Egypt, 23 June, 1905.
T.H.	Male	Ireland	Bullock-driver	65	11 July, ,,	Coast Hospital	XCIX	Discharged, 19 Dec. 1905. Readmitted 19 Aug., 1907. Again discharged, 22 Feb., 1919.
J.W.	,,	Tanna	Labourer	40	11 ,, ,,	Maclean	C	Died, 30 Oct., 1906.
T.A.	,,	Ambrym	,,	35	11 ,, ,,	,,	CI	
H.G.	,,	Gala	,,	35	14 Nov., ,,	Tweed River	CIII	Died, 18th Feb., 1915.
G.B.	,,	Vanua Lava	,,	38	9 Jan., 1906	,,	CV	Died, 31 Aug., 1912.
G.A.	,,	Ambrym	,,	35-40	15 Aug., ,,	,,	CVI	Returned to native island, 1 Dec., 1908.
A.M.	,,	China	Gardener	30	4 Sept., ,,	Nyngan	CVII	Returned to Hongkong, 9 Nov., 1905.
L.A.	,,	Ambrym	Labourer	35	9 Oct., ,,	Tweed River	CVIII	Returned to native island, 9 May, 1908.
C.B.	,,	China	Hawker	48	9 ,, ,,	Sydney	CIX	Returned to Hongkong, 9 Nov., 1906.
A.M.	,,	,,	Wood-cutter	58	9 ,, ,,	Glen Innes	CX	
W.D.	,,	Lifu	Gardener	30	20 Nov., ,,	Turramurra	CXI	Died, 2 April, 1910.
P.S.	,,	India	Hawker	35	19 Jan., 1907	Nowra	CXII	Absconded, 18 May, 1907.
C.S.C.	Female	Victoria		40	16 April, ,,	Maroubra	CXIII	
Ah J.	Male	China	Hawker	40	17 Sept., ,,	Sydney	CXIV	Died, 14 May, 1924.
H.F.	,,	,,	Cabinet-maker	40	29 Oct., ,,	Warren	CXV	Died, 5 May 1913.
F.P.	,,	England	None	68	14 Jan., 1908	Sydney	CXVI	Died, 11 Aug., 1909.
A.R.	Female	N.S.W.	School	7	14 ,, ,,	Lismore	CXVII	
T.W.C.	Male	,,	Farmer	45	18 Mar., 1909	Manilla	CXVIII	Died, 2 Nov., 1910.
P.J.	,,	Syria	Hawker	54	10 Nov., ,,	Yalgogrin	CXIX	Repatriated, 1 Feb., 1911.
A.Z.	,,	Greece	Sculleryman	17	11 Oct., 1910	Sydney	CXXII	Repatriated, 1 Feb., 1911.
J.C.	,,	England	Miner	48	15 Nov., ,,	,,	CXXIII	
J.A.	,,	Syria	Hawker	35	29 ,, ,,	,,	CXXIV	Discharged, 15th April, 1920.
C.M.	,,	Tonga	Gardener	45	8 June, 1911	North Sydney	CXXV	Died, 26 April, 1923.
T.L.	,,	China	Cabinet-maker	49		Botany	CXXVI	Died, 8 Oct., 1911 (before transfer)
M.B.	Female	Ireland	Teacher	33	7 Nov., 1911	Lismore	CXXVII	Died, 10th July, 1915.
S.C.	Male	China	Cabinet-maker	40	21 May, 1912	Boolaroo, N.S.W.	CXXVIII	
L.J.T.	,,	N.S.W.	School	12	14 Aug., ,,	Lismore	CXXIX	Discharged, 21 July, 1916.
S.M.	,,	Mallicolo	Labourer	50	27 ,, ,,	Maclean	CXXX	Died, 23 April, 1919.
J.F.	,,	N.S.W.	Van-driver	28	19 Sept., ,,	Glebe	CXXXI	Discharged, 1 January, 1920.
W.D.	,,	,,	Fisherman	22	24 June, 1913	Ulladulla, S. Coast	CXXXII	Discharged, 10 Feb., 1921.
J.M.	,,	New Hebrides	Labourer	60	28 Nov., ,,	Tweed River	CXXXIII	Died, 17 March, 1917.
J.C.M.	,,	N.S.W.	Miner	26	28 Jan., 1914	Homeville, W. Maitland.	CXXXIV	Died, 17th June, 1915.
W.B.	,,	England	Dealer	33	4 Mar., ,,	Sydney	CXXXV	Died, 14th August, 1915
A.C.P.	,,	N.S.W.	School	15	23 June, ,,	Lismore	CXXXVI	Discharged, 12 October, 1922. Re-admitted 16 Jan., 1925.
E.W.	,,	South Sea Islands	Labourer	50	17 Nov., ,,	Cudgen	CXXXVII	Died, 7 January, 1924.
H.H.	,,	England	Labourer	36	19 May, 1915	Hornsby	CXXXVIII	
A.D.	Female	New Hebrides	Domestic	19	1 Sept., ,,	St. Kilda, Victoria	CXXXIX	Died 18th July, 1923.
C.F.	Male	China	Cabinet-maker	50	18 Dec., ,,	Waterloo, N.S.W.	CXL	Discharged, 10 March, 1917.
L.F.	,,	England	Showman	45	9 Mar., 1916	Campbelltown	CXLI	Discharged, 2 June, 1917.
F.H.	Female	China	Gardener	48	25 May, ,,	Sydney	CXLII	Died, 15 June, 1916.
D.M.	Male	N.S.W.	Publican	46	25 ,, ,,	Armidale	CXLIII	Discharged, 19 May 1917.
W.J.P.	,,	,,	School	12	25 Nov. ,,	Lismore	CXLIV	Disch. 5 November, 1924.
E.L.P.	,,	,,	,,	11	25 ,, ,,	,,	CXLV	Died, 27 December, 1922.
E.M.	,,	Germany		56	3 April, 1917	Liverpool, N.S.W.	CXLVI	Repatriated as Prisoner of War, 27 May, 1919.
C.W.	,,	England		80	14 ,, ,,	Sydney	CXLVII	Died, 18 February, 1923.
C.D.	Female	N.S.W.	Domestic	54	30 Oct., ,,	Casino, N.S.W.	CXLVIII	Discharged, 12 June, 1920.
P.P.	Male	Greece	Cafe-proprietor	33	21 Feb, 1918	Melbourne, Vic.	CXLIX	
J.C.	,,	Ireland	Miner	84	5 Feb., 1919		CL	Died, 19 November, 1920
M.T.	Female	Victoria	Housewife	63	25 Feb., ,,	Sydney	CL(A)	Died, 1 May, 1919.
J.P.	Male	Malta	Labourer	29	18 June, ,,		CLI	Absconded, 14 Sept., 1919.
J.S.	,,	,,	,,	30	22 Dec., ,,	Kempsey	CLII	Died, 29 July, 1921.
A.S.	,,	China	Gardener	64	3 Aug., 1920	Kandos N.S.W.	CLIII	Died, 2 August, 1923.
C.T.P.	,,	,,	Labourer	30	19 Oct., ,,	Nauru Island, S. Pacific.	CLIV	Discharged, 25 April, 1921.
E.T.D.	,,	N.S.W.	Teamster	32	10 Nov., ,,	Bellingen, N.S.W.	CLV	Discharged 1 Dec., 1925.
T.F.	,,	Ireland	Civil servant	57	20 Dec., ,,	Hobart, Tas.	CLVI	Discharged, 18 June, 1921.
A.W.	Female	Sweden	Seamstress	62	18 Feb., 1921	Newcastle	CLVII	
D.A.	Male	N.S.W.	Teamster	71	26 May, ,,	Newcastle	XC	Died, 16 July, 1921.
J.C.	,,	N.S.W.	Fisherman	22	18 Aug., ,,	Tilba Tilba	CLVIII	
A.S.	Female	Queensland	Domestic	20	19 Jan., 1922	Redfern	CLIX	Returned to Peel Island, Queensland, 20 March, 1922.
Y.M.B.	Male	France	Labourer	67	7 June, ,,	Hunter's Hill	CLX	Died, 12 August, 1922.

* Native of New South Wales, of European descent. † Of European descent. ‡ Omitted in error from Annual Report for 1919.

Return showing particulars of Lepers detained at Little Bay, New South Wales, since the year 1883—*continued.*

Name.	Sex.	Native of —	Occupation.	Admission.		Where from.	No. of Case in Clinical Notes.	Died or Discharged.
				Age on.	Date of.			
E ...	Male ...	Ceylon	Sailor	24	13 Dec. 1922.	Not fixed	CLXI	Repatriated, 26 June, 1923.
R B. ...	,, ...	N.S.W.	Coach-painter	42	18 June, 1923.	Taree, N.S.W.	XCV	Died, 5 August, 1923.
C.E.B. ...	,, ...	Northern Terr.	Garage-proprietor	35	11 Aug. 1924.	Darwin, N.T.	CLXII	Discharged 16th Sept., 1925.
H.L.S. ...	,, ...	N.S.W.	Invalid-pensioner...	37	26 Oct., 1924.	Liverpool Asylum ..	CLXIII	
J.B.	,, ...	Ireland	Bush worker ...	61	28 Jan., 1925	Liverpool	CLXIV	
A.C.	,, ...	Germany	Importer	45	6 Mar., ,,	Sydney	CLXV	Absconded, 21 August, 1925.
K......... ...	,, ...	Hawaii	Musician	...	7 ,, ,,	,, ...	CLXVI	Repatriated, 11 March, 1925.
A.M. ...	,, ...	China...........	School	12	12 ,, ,,	,, ...	CLXVII	Repatriated, 16 December, 1925.
A.D.	,, ...	N.S.W.	,, ...	7	21 April, ,,	,, ...	CLXVIII	Discharged, 1 December, 1925.
Wong Tee	,, ...	China...........	Gardener	46	22 Nov., ,,	Clarence River ...	CLXIX	
H.P.	,, ...	N.S.W.	Farmer	39	14 Dec., ,,	Queensland	CLXX	

Notes.—(*a*) The cases of a few other persons who, for one reason or other, were never admitted to the lazaret, have been mentioned in the course of this series of Reports, and are additional to those shown in this Table. (*b*) On comparison with the reports for early years, differences in ages or dates of admission of some coloured patients will be observed. Those now given are the correct ages and dates. Patients remaining under treatment have their initials shown in black-faced type.

APPENDIX B.

I.—New Cases.

Case CLXIV—J.B., m., born in Ireland in 1864; bush worker; admitted 28th January, 1925.

History.—Came to Australia in 1884 and has lived in Queensland, New South Wales or New Guinea ever since. When younger, he was a miner and prospector. Latterly he has been a casual worker.

Clinical history.—Says he has been out of sorts since 1913. Eight months ago more definite failure of health—weakness, tenderness and numbness of the feet, which became "purple in patches." Later, hands became affected in the same way, so that he could not handle tools, and burnt himself on occasions. His nose became blocked, especially the left nostril. He was sent from Boorowa to Liverpool Hospital, and having been recognised there as a leper by the Medical Superintendent, was transferred here on the same day.

On admission.—Height, 5 feet 7 inches; weight, 135 lb. Head.—Forehead red; both eyebrows infiltrated; hair of eyebrows bushy; conjunctivitis; left pupil is somewhat excentric and larger than right; nose blocked on left side; teeth good; earlobes infiltrated. Trunk.—Macules of brownish hue on chest and abdomen. Upper limbs.—Both ulnar nerves thick and hard; right elbow tip voluminous; both hands are anaesthetic and cyanosed. Lower limbs.—Both peroneal nerves thickened; both feet anaesthetic and cyanosed.

B.Leprae.—In smears from left eyebrow and right eyebrow.

Treatment and Progress.—From date of admission until 8th September he had intramuscular injection of E.C.C.O. twice weekly, the dose being 1 cc. for two months, then 2 c.c. His weight increased to 146 lb., but the lepra symptoms remained about the same.

Case CLXV—A.C., m., born in Germany, 1880; importer; admitted 6th March, 1925.

History.—Came to Australia in 1913, and since then has lived in Queensland; came to Sydney two and a half years ago.

Clinical history.—For about five years has had numbness of right foot and leg, of both hands, and of right ear, with feeling of pins and needles about the fingers; three months ago first nodules on the neck. Consulted a surgeon about his legs, and was sent by him to the Royal Prince Alfred Hospital, where leprosy was diagnosed.

On admission.—Height, 5 feet 8 inches; weight, 11 st. 5 lb. Head and neck.—Infiltration of both eyebrows and earlobes and of large area of right cheek; right and left anterior cervical nerves thickened over sterno mastoid. Trunk.—One or two macules on back. Upper limbs.—Both ulnars thickened; hands cyanosed and partly anaesthetic. Lower limbs.—Small infiltrated areas on buttocks; some anaesthesia of right foot, outer side. B. Leprae from both ear lobes and from eyebrow.

Treatment and progress.—In March had eight injections of E.C.C.O., but no more because they caused pain. He went on with Ol. Chaulmoog internally. In May an acute exacerbation set in. The nodules became painful and swollen, and he had much neuralgia in left eyebrow, face and right lower limb, especially the foot. This continued throughout June, and early in July both feet were still stiff though less painful. During July he rapidly improved and on 1st August his weight was 11 st. 13 lb. On 21st August he absconded, and there is reason to believe that he left Australia.

Case CLXVII.—A.M., male; born in China 1913; schoolboy; admitted 12th March, 1925.

History.—Came to Australia in August, 1923, and has been at school in Sydney ever since.

Clinical History.—About August, 1924, a "swelling" began above right eyebrow which persisted and subsequently became pigmented; next, a pigmented patch appeared on right cheek, and gradually spread; later, similar patches on right arm and leg; general health unaffected.

On Admission.—Height, 4 ft. 8 in. Weight, 70 lb. Head.—On forehead pigmented area, 1 in. wide, extends from inner end of right eyebrow to margin of hairy scalp; right malar region occupied by large pigmented area. Another area just below right angle of mouth; spot on tip of nose; in these areas skin is thickened and of dull red colour; sealy in places; edges thicker than centre; insensitive to light touch. Right upper limb.—From just above elbow to the hand, the ulnar half is occupied by an irregular discoloured area; margin thicker and darker than centre; on back of hand an isolated patch size of shilling; anæsthesia of both these areas and of little finger and ulnar side of ring finger; ulnar nerve thickened and insensitive. Left upper limb.—Two spots on forearm; not anæsthetic. Right lower limb.—Two isolated spots on thigh. Over anterior surface of leg an anæsthetic area similar to that on right upper limb. Smears were made from right elbow tip and right forearm, but no acid fast bacilli were found.

Treatment and Progress.—Intra-muscular injection of E.C.C.O., 1 c.c. twice a week, and sodium gynocardate, gr. 15 per diem in tablet. Ichthyol ointment locally.

His weight increased to 86 lb. on 1st December, 1925, and all the lesions improved.

He was discharged on 16th December, 1925; on that day embarked to return to China.

Case CLXVIII.—A.D., male; born in New South Wales, 1918; admitted 21st April, 1925.

History.—He is a son of E.T.D.; admitted 10th November, 1920.

Clinical History.—In November, 1923, there was a slightly discoloured macula, size of shilling, over the sacrum.

On Admission.—On each buttock there is a large macule, crescentic in outline, with darkly pigmented margin and paler centre; the skin of these areas is partially insensitive. Height, 4ft. 2in. Weight, 44lb. Smears from the gluteal areas and from the L. Naris did not shew any acid fast bacilli.

Progress and Treatment.—Tabloid Sod-Gynocardate, gr. 2–3 daily. By November the maculae were no longer visible, and he was discharged 1st December, 1925.

Case CLXIX.—Wong Toe, male; born in China 1879; gardener; admitted 22nd November, 1925.

History.—Came to Queensland in 1898; three or four years later moved to New South Wales; lived in Lismore, Coraki, and other North Coast towns. Revisited China in 1907, and on three or four subsequent occasions. Has resided in Maclean, Clarence River, for three years, working with another gardener on the halves system.

On Admission.—Height, 5 ft. 1½ in.; weight, 107 lb. Head and neck.—Eyebrows very scanty, skin thickened; corneal haziness in both eyes; cheeks, Alae Nasi, chin, skin thickened and infiltrated; bridge of nose depressed. Trunk.—Nil. Upper limbs.—Right.—Ulnar nerve thick and hard; infiltration of elbow tip, forearm and hand; hand and fingers cyanosed and glossy; healing ulceration along ulnar border of forearm; main en griffe well marked; partial anæsthesia of ulnar distribution. Left.—Changes similar to those of right forearm, but less marked. Lower limbs.—Right.—Much pigmented scarring of leg; large ulcer of back of leg, smaller ulcer of front; old scars of thigh; big toe and the next have quite lost their nails, and have become shortened by absorption; small perforating ulcer of big toe. Left.—Pigmented and infiltrated; extensive ulcer of instep; fourth toe nearly all gone; well healed stump. Buttocks macular staining.

B.Leprae obtained in abundance from all the ulcers, and from both eyebrows and left elbow.

Case CLXX.—H.P., male; born in New South Wales, 1886; farmer; admitted 14th December, 1925.

History.—For past twelve years has been farming (dairying and cane growing) in Queensland.

Clinical History.—In July, 1925, first noticed a spot on back of lower third of right leg. About August or September spots began to come on face. Has been under treatment in Royal Prince Alfred Hospital for past seven weeks. At that hospital repeated examination of serum from the skin lesions failed to shew acid-fast bacilli, but these were found in sections of a portion of right sural nerve excised for this purpose.

On Admission.—Height, 5 ft. 9 in.; weight, 125 lb. Face.—Several dull red areas on forehead, bridge of nose, upper and lower lips, chin, right cheek, left ear lobe. Upper Limbs.—A few similar areas on arms; left ulnar harder than right, but not thickened or tender. Lower Limbs.—Similar areas on both legs, especially right. The areas are insensitive, and this anæsthesia extends over outer side of right leg and foot.

B.Leprae were not found in smears made from forehead, lower lip, left ear lobe, nasal mucous membrane, right calf.

II.—Readmission.

Case CXXXVI.—A.C.P., m.; born New South Wales, 1898; farmer; re-admitted 16th January, 1925.

History.—Has been out on parole since 12th October, 1922. *Vide* previous reports.

On Readmission.—Height, 5 feet 7½ inches; weight, 126 lb. Head.—Face generally bronzed and cyanotic; on right eyebrow is a slightly infiltrated reddened area; both corneae are hazy, and irides muddy; both pupils are excentric. Upper limbs.—Both ulnar nerves enlarged and hard. Lower limbs.—Skin over right leg and patellae, thickened, and red. B.Leprae from right eyebrow and right knee abundant.

Progress and treatment.—Has chronic eye trouble, mostly due to iritis; treated with atropin, dionin and zinc sulph. In February complained of cardiac pain, and was found to have presystolic murmur, apex beat in nipple line, no oedema. Occasionally urticarial eruption. In December weight had increased to 140 lb. Has taken Ol. Chaulmoogra, min. 90 per diem, fairly regularly.

III.—Discharges.

Case CLXV.—A.C., m.; born 1880; admitted 6th March, 1925; absconded 21st August, 1925 (*vide* notes above).

Case CLXII.—C.E.B., m.; born 1890; discharged, 16th September, 1925.

No fresh manifestations of the disease, no bacilli ever obtained.

Board of Health approved of release, on the usual condition of examination every six months as long as he remained in New South Wales.

During the year he had intra-muscular injection of E.C.C.O twice a week, 1 c.c at first, later 2 c.c per dose. The muscular staining became less marked, and also the anæsthesia of feet.

Case CLV.—E.T.D., m; born 1890; admitted 10th November, 1920; discharged 1st December, 1925.

No fresh manifestations having occurred for at least eighteen months, and no B.Leprae having been found in any smears, the Board of Health approved of his release under usual condition of reexamination every six months.

Case CLXVIII.—A.D., m.; born 1918; admitted 21st April, 1925.

Discharged 1st December, 1925 (*vide* notes above).

Case CLXVII.—A.M., m.; born 1913; admitted 12th March, 1925.

Repatriated to China, 16th December, 1925. (*Vide* notes above).

IV.—Death.

Case IV.—A.G., m.; born 1876; admitted 20th August, 1890.

He was discharged 1st May, 1895, in view of his apparent recovery (*vide* Leprosy Report for 1895).

Readmitted to Coast Hospital, but not to Lazaret, on 15th July, 1925; extremely ill-nourished and ænemic, and with symptoms suggestive of Lepra nervorum.

Died, 21st July, 1925.

V.—Progress Report on patients remaining in 31st December, 1925.

Case XVII.—C.T., m., Javanese; born about 1862; admitted 14th August, 1886.

Bed ridden most of the year. No change in leprous condition.

Case LXXXVII.—F.E.B., m., born 1876; admitted 25th November, 1903.

No acute symptoms during year.

Case LXXXVIII.—G.M.S., f., born 1885; admitted 9th February, 1904.

Leprosy quiescent. General health good.

Case CI.—T.A., m., born 1870; admitted 11th July, 1905.

No fresh signs.

Case CXIII.—C.S.C., f., born 1867; admitted 16th April, 1907.

No fresh signs.

Case CXVII.—A.R., f., born 1901; admitted 14th January, 1908.

About the same throughout the year.

Case CXXIII.—J.C., m., born 1862; admitted 15th November, 1910.

In February fresh infiltration of left buttock. In April much pain in lower limbs, and increased cyanosis of hands and feet. In June, July and August confined to bed with swelling of left foot, due to further necrosis of first metatarsal. Throughout the year had intra-muscular injection of E.C.C.O. twice a week—2 c.c for dose.

Case CXXVIII.—S.C., m., born 1872; admitted 21st May, 1912.

Condition unchanged.

Case CXXXVII.—E.W., m., born 1864; admitted 17th November, 1914.

Condition unchanged.

Case CXLIX.—P.P., m., born 1885; admitted 21st February, 1918.

Throughout the year numerous nodules. Many of these having become ulcerated, he was given Calcium lactate grains 10 three times a day, and Parathyroid gr. 1/10 twice daily. This appeared to have a beneficial effect, and all the ulcerated surfaces healed. He declines Chaulmoogra, Gynocardate, and E.C.C.O. treatment.

Case CLVII.—A.W., f., born 1859; admitted 18th February, 1921.

In June many fresh manifestations of leprosy. On the face raised red patches, and blebs of clear fluid above and below left eye and below right eye. On the lower limbs extensive macular staining. Weight decreased from 131 lb. in January to 119 lb. in October.

Case CLVIII.—J.C., m., born 1899; admitted 18th August, 1921.

Fresh crops of nodules in May and September.

Case CLXIII.—H.L.S., m., born 1887; admitted 22nd October, 1924.

No fresh manifestations. General health good.

3.—DAVID BERRY HOSPITAL.

Berry, New South Wales.

REPORT of the Secretary for year ending 31st December, 1925.

Staff.—Visiting Medical Officer, A. L. Stafford, M.B., Ch.M.; Secretary, H. Bruce; Matron, Miss D. G. Cawood.

Resident Staff.—Matron, 1 Sister, 1 Nurse, 5 Pupil Nurses, Cook, Laundress, 1 Female Attendant, and 3 Male Attendants.

Number of Wards and Beds.—Number of wards, 6; beds, 26 (22 beds, 4 cots).

General cases.—Ward 1 (12,144 cubic feet), 10 beds, 1 cot; ward 2 (9,936 cubic feet) 8 beds, 1 cot; ward 3 (2,016 cubic feet) 1 bed; ward 4 (2,016 cubic feet) 1 bed.

Infectious cases.—Ward 5 (2,160 cubic feet) 1 bed, 1 cot; ward 6 (2,160 cubic feet) 1 bed, 1 cot.

Admissions and Discharges, 1925.—Remaining in on 1st January, 1925, 11; admitted during 1925, 269; discharged, 253; died 13; remaining in on 31st December, 1925, 14; total, 289. Average daily number resident 15·56. Total cost of maintenance, £3,696 18s. 9d. Average cost per head, £237 5s. 0d.

Sir,

I have the honour to submit to you the annual report of this hospital for 1925. A review of the year's work shows that many successful operations have been performed, and the high standard of efficiency of past years has been maintained by the medical and nursing staff.

In-patients in 1925 numbered 280, compared with 289 in 1924, and 295 in 1923.

Out-patients.—72 out-patients were treated, as compared with 109 in 1924.

Anæsthetics administered totalled 112 (66 major and 46 minor operations). Visits made from Nowra were: Dr. Foy, 13 visits; Drs. Rodway and Whitfield (Assistant), 14; Dr. Ryan, 13; Dr. George, 9. A total of 49 visits were made, and 89 anæsthetics administered.

Infectious cases.—Only one infectious case was admitted.

Collections.—Total collections amounted to £318 4s. 5d., compared with £283 12s. in 1924.

Building and Repairs.—The buildings are in a very fair state of preservation, and no repairs were made during the year.

Grounds have been well kept; trees and shrubs are rapidly improving, and the results from the vegetable garden were more satisfactory.

Staff.—Dr. Stafford is the present Medical Superintendent and Miss D. G. Cawood was permanently appointed as Matron in September.

H. BRUCE,
Secretary.

4.—MONTROSE MATERNITY HOSPITAL.

Lucas-road, Burwood.

Honorary Medical Staff.—H. B. Hetherington, M.D., Ch.M.; A. L. Lance, M.B., Ch.M.; G. R. Walker, M.B., Ch.M.; J. H. R. McCutcheson, M.B., Ch.M.; G. C. Harper, M.B.

Resident Staff.—Matron, E. M. Copeman; 2 Staff Nurses (nursing and obstetric certificates); 5 Certificated Nurses (Obstetric trainees); 1 Cook; 1 Housemaid.

Number of Wards and Beds.—Ward A, 4,377 cubic feet, 4 beds, 4 cots; Ward C, 77,037 cubic feet, 8 beds, 8 cots.

The hospital was opened in 1920, and to December, 1925, there have been 1,302 admissions.

Admissions and Discharges, 1925.—Remaining in hospital 31st December, 1924, 3; admitted during 1925, 254; discharged, 235; died, 1; remaining on 31st December, 1925, 11. Average daily number residents, 7. Annual cost of maintenance, £1,690. Average cost per bed, £241 8s. 7d.

One adult death occurred; the case was admitted in an unconscious state, at 7.30 p.m., and died at midnight. Three babies died, one lived for 14½ hours; one for 26 hours, and one, a premature baby, lived 6 days.

Improvements completed during the year comprised provision of additional windows and door in Ward C, and doorway on to balcony, and a small room in which to keep sterilised utensils.

E. M. COPEMAN,
Matron.

5.—FERNLEIGH PRE-AND POST-MATERNITY REST HOME.

Victoria-street, Ashfield.

Honorary Medical Staff.—A. L. Lance, M.B., Ch.M.; J. H. R. McCutcheon, M.B., Ch.M.; G. R. Walker, M.B., Ch.M.; G. C. Harper, M.B.

Resident Staff.—Matron: Miss L. D. Meares; Head Nurse: Miss Alcock.

Number of Beds and Wards.—Ward A, 6,543 cubic feet (6 beds, 6 cots); Ward B, 6,480 cubic feet (7 beds, 3 cots); Ward C, 4,104 cubic feet (4 beds). Total, 17 beds, 9 cots.

Annual return of Admissions and Discharges.—Remaining in on December 31st, 1924, 7; admitted during 1925, 197; discharged, 197; remaining, 31st December, 1925, 7. Average daily number resident, 9. Annual cost of maintenance, £1,518. Average cost per bed, £168 13s. 4d.

1925 was the busiest year since the opening of the Home. Many of the patients required medical treatment, and three were transferred to other hospitals (epilepsy, 1; pyelitis, 1; injury to knee due to fall, 1).

Sincere thanks are due to the medical staff who visit when called upon.

Miss Alcock was granted 3 months' leave of absence to train in Child Welfare at "Tressillian" and the knowledge gained has been a boon to mothers in the care of their babies.

Sufficient eggs and vegetables are produced for use in the Home, and any surplus is sent to Montrose Maternity Hospital.

L. D. MEARES,
Matron.

LADY EDELINE HOSPITAL FOR BABIES.

Greycliffe, Vaucluse.

Visiting Medical Officer, Dr. L. R. Parker.

Honorary Staff of Consultants.—Drs. C. P. B. Clubbe and T. Storie Dixson, Consulting Physicians; Dr. Norman Paul, Consulting Dermatologist; Dr. Cyril Shepherd, Consulting Ophthalmic Surgeon; Dr. R. S. Godsell, Consulting Ear, Nose, and Throat Surgeon.

Nursing Staff.—Matron: Miss H. J. Turner; two Staff Nurses and ten Pupil Nurses.

Number of Wards and Beds.—Ward 1 (4,330 cubic feet), 12 cots; Ward 2 (5,000 cubic feet), 15 cots; Ward 3 (4,000 cubic feet), 4 cots and 4 beds; Flowers Ward (1,500 cubic feet), 5 cots; Isolation Ward (2,500 cubic feet), 5 cots and 1 bed. Total—5 Wards; 41 cots, 5 beds.

Annual Return of Admissions and Discharges.—Remaining in hospital on 1st January, 1925, 31; admitted during the year, 199; discharged, 178; died, 23; total under treatment, 230; remaining in hospital, 31st December, 1925, 29; daily average number of cots occupied, 29·6; average length of stay in hospital, 9·8 weeks; mothers accommodated within the hospital, 57; outdoor cases, advice and treatment, 115.

Annual cost of maintenance and treatment, £2,839. Average cost per occupied bed, £95 18s. 3d.

VISITING MEDICAL OFFICER'S REPORT.

For the year 1925 the work at Greycliffe has been considerable in excess of the previous year, when only 156 babies were admitted, as compared with 230 this year. Out of this number there were 23 deaths from all causes, a fatality rate which is very appreciably lower than in 1924.

There would not appear to be any special feature attaching to the work of this twelve months, there being no epidemic of special type or dimensions. Nevertheless, during the periods of high temperature in the summer months there was a constant succession of admissions suffering from acute intestinal disorders, many of which, despite unremitting care and attention, it was not possible to save.

L. R. PARKER,
Visiting Medical Officer.

MATRON'S REPORT, 1925.

Nature of Illness and Result of Treatment.—Acute gastro-enteritis, 31 (10 deaths); enteritis (malnutritional, 58 (3 deaths); broncho-pneumonia, 7 (3 deaths); marasmus, 75; pyelitis, 4 (1 death); pyloric stenosis, 6; bronchitis, 16; spina bifida, 1 (died); congenital heart disease, 1 (died); tubercular colitis, 2 (died); prematurity, 2 (died); general peritonitis, 1; cerebro-meningitis, 1; ileo colitis, 18; middle ear abscess, 3; rachitis, 1; eczema, 4. Total cases treated, 231; deaths, 23.

One foundling was treated for exposure and sent to a babies' home.

Three cases of measles developed soon after admission; there was no spread of the infection.

There were no epidemics within the hospital during the year and reinfection was rare.

Mortality.—The heaviest mortality occurred during the months of January and December.

TABLE showing ages on admission of all babies treated during 1925, number of deaths, and duration of stay in hospital of fatal cases.

	3 months.	3—6 months.	6—9 months.	12 months and over.	Total
	81	68	51	26	230
Died	10	9	3	1	23
Duration of stay in hospital of fatal cases......	6 hours ...1 3 days ...1 4 ,, ...1 6 ,, ...1 12 ,, ...2 16 ,, ...1 19 ,, ...1 28 ,, ...1	3 days ...1 4 ,, ...2 15 ,, ...1 18 ,, ...2 20 ,, ...1 25 ,, ...1 27 ,, ...1	2 days ...1 25 ,, ...1 30 ,, ...1	6 days ...1	

The dairy at Carrara, as usual, proved satisfactory. An average of 8·4 gallons of milk was supplied daily for infant feeding; the milk is delivered morning and afternoon, and the cows are regularly tested with tuberculin.

The sewing guild, conducted by a committee of local ladies, helps to keep the supply of baby clothing up to the required standard. This work has been most useful.

A number of children in the district collected for and supplied an electric radiator for the convalescent ward at a cost of £4 10s. This gift is much appreciated and adds considerable to the cosiness of the ward and the comfort of the babies.

H. J. TURNER,
Matron.

7.—STRICKLAND CONVALESCENT HOSPITAL FOR WOMEN, CARRARA, ROSE BAY.

Report of the Matron for the year ended 31st December, 1925.

Visiting Medical Officer.—Dr. L. R. Parker.

Resident Staff.—Matron, Miss S. G. Hartley; 1 Senior and 1 Junior Nurse.

Number of Wards and Beds.

No. of wards, 9; No. of beds, 32.

Ward A, 4,038 cubic feet; Ward B, 8,557 cubic feet; Ward C, 4,038 cubic feet; Ward D, 3,477 cubic feet; Ward E, 3,477 cubic feet; Ward F, 7,334 cubic feet; Ward G, 3,477 cubic feet; Ward H, 1,736 cubic feet; Ward I, 2,232 cubic feet.

This delightfully situated hospital is utilised for women convalescent after severe illnesses.

Annual Return of Admissions and Discharges.

Number of patients remaining in on 1st January, 1925, 28; admitted during 1925, 637; total number under treatment during 1925, 637; discharged, 636; remaining in residence at 31st December, 1925, 29; average daily number of beds occupied, 33; total cost of maintenance, £2,690; average annual cost per inmate, £81 10s. 4d. From the date of its establishment in 1915 to the end of 1925 there have been 5,684 convalescents in residence.

The year has been very satisfactory, as the daily average has been maintained, although this year no mothers with babies have been admitted. Many improvements have been made adding greatly to the comfort of the patients and staff, and improving the general appearance of the hospital. Owing to indifferent labour the flower and vegetable garden has not been at all satisfactory.

Portion of the grounds is utilised for a dairy herd, the milk from which supplies the infants at the Greycliffe Hospital for Babies. A well-stocked poultry yard yields a plentiful supply of eggs and poultry when required.

S. G. HARTLEY,
Matron.

8.—DENISTONE HOUSE CONVALESCENT HOSPITAL FOR MEN, EASTWOOD.

Annual Report for the Year ended 31st December, 1925.

Visiting Medical Officer.—Dr. D. Guthrie Hunter.

Resident Staff.—Matron, Miss I. M. Shiell; Nurse, Miss A. C. Healey; Attendant, Mr. G. Wardell.

Number of rooms used as wards, 7; in-door beds, 29.

Since the opening of Denistone House in 1915, there have been 3,299 admissions.

Annual Return of Admissions and Discharges.

Patients in hospital, 31st December, 1924, 21; admitted during 1925, 275; remaining in hospital, 31st December, 1925, 18; total under treatment during the year, 295; daily average number resident, 21; annual cost of maintenance and treatment, £2,299; average cost per bed, £109 9s. 6d.

Denistone House is 387 feet above sea-level and is particularly suited as a convalescent hospital; patients derive great benefit from their stay and improve rapidly in health.

Sufficient milk, eggs, fruit and vegetables are produced for hospital requirements, the output in 1925 being about 2,828 gallons of milk, 2 cwt. of fruit, 496 dozen eggs, and 5 tons of vegetables.

I. M. SHIELL,
Matron.

9.—WATERFALL SANATORIUM.

Report of the Medical Superintendent for the year ended 31st December, 1925.

Honorary Staff.

Honorary Consulting Physician, Dr. S. H. MacCulloch; Honorary Physician, Dr. Cecil Purser.

Resident Administrative Staff.

Medical Superintendent, Dr. H. W. Palmer; Senior Medical Officer, Dr. Kynaston Denham, D.S.O. Manager, Mr. R. C. Rowe; Matron, Miss K. Walsh; Clerk and Storekeeper, Mr. A. Douglass.

Constitution of Hospital Staff on 31st December, 1925.

Medical and Administration: Medical Superintendent, Senior Medical Officer, Manager, Matron, Clerk. *Nursing*: Sub-matron, 4 Sisters, 22 Nurses. *General*; 1 Foreman, 3 Artisans, 3 Male Cooks, 12 Attendants, 1 Female Cook, 1 Servant.

Number of Wards and Beds.

No. of Ward.	Capacity in cubic feet.	No. of Beds and Cots.	Cubic feet to each Bed.	No. of Extra Beds in Open Air.	No. of Ward.	Capacity in cubic feet.	No. of Beds and Cots.	Cubic feet to each Bed.	No. of Extra Beds in Open Air.
1	28,800	28	1,028	3	10	Open ward	...	....	11
2	28,800	28	1,028	4	A	28,800	28	1,028	......
3	28,800	28	1,028	4	B	28,800	28	1,028	12
4	28,800	28	1,028	4	C	28,800	28	1,028	......
5	21,600	18	1,200	3	D	28,000	28	1,028	......
6	21,600	18	1,200	7	Chalets	....	....	....	20
7	28,800	28	1,028	4					
8	28,800	28	1,028	3					
9	Open ward	...	....	26		Total ...	316	....	101

Total number of beds for male patients—In wards, 273; in chalets, 20; total, 293. Female patients—In wards, 124. Total beds for male and female patients—In wards, 397; chalets, 20; total, 417.

Admission and Discharge of Patients for 1925.

Number of patients remaining in on 1st January, 1925, 396; admitted during 1925, 587; total number under treatment, 983; discharged ("arrested" cases, 47; "much improved" cases, 115; "improved," 195; "unimproved," 31) 388; died, 158; remaining in residence at 31st December, 1925, 437; average daily number of occupied beds, 418·64; total cost of maintenance, £37,651 2s. 4d.; average annual cost per inmate, £67 3s. 4d.

Condition on discharge and average residence in days of the 388 discharged patients—average residence of all discharged cases, 317 days.

	No. of Patients.	Average Residence.
		Days.
Disease arrested	47	624
Much improved	115	279
Improved	195	287
Unimproved	31	80
Total	388	1,270

During the past year there have been 983 patients under treatment (653 males and 330 females). At the beginning of the year there were 280 males and 116 female patients in residence, and 374 males and 213 female patients were admitted during the year; 259 males and 129 female patients were discharged, and 101 males and 57 females died. As the above table shows, 47 of the discharged patients were classed as arrested cases; 115 as much improved and able to resume light work again, 195 as improved; 31 were unimproved and gained little benefit from their stay. There remained in residence on 31st December, 1925, 437 patients (294 males and 143 females).

Treatment has been mainly along ordinary sanatorium lines, though tuberculin and antigen were used in a few cases, as was also sodium morrhuate. Volatile oils were tried by continuous inhalation on masks for a number of patients, fine and coarser vapour sprays being used. Apart from giving a certain amount of relief, especially in throat cases, no special curative results were noticed. Several patients were treated over a period of four months with "Ostelin," a preparation stated to contain the vitamins of cod liver oil. No benefit was noticeable from its use other than a little increase in weight. Most of the patients complained that it was unpalatable and only consented to continue to take it when told it was a special remedy. In a Sanatorium diet "Ostelin" is hardly indicated, although it may be of value for poorly fed children.

During the year Spahlinger's cure has been much discussed. Whatever its merits may prove in the future, it has so far been only the cause of much disappointment, and has hindered progress in other methods needful for the control of tuberculosis.

Even should a cure for tuberculosis be found, early diagnosis, notification of cases, proper treatment, after care, and special supervision will always be necessary, while now they are essential to any method of control to prevent spread of infection. Though the proper carrying out of these essentials will be dependent on the money available, much improvement would be possible with little extra expenditure, if only the best use was made of the funds now available. At the beginning of the year much was expected from the co-ordination and linking up of all the different anti-tuberculosis agencies. Unfortunately no considerable progress has been made so far though all concerned are anxious to work together. Control of tuberculosis should be vested in a central board having on it representatives of all tuberculosis agencies who could supervise all matters concerning tuberculosis and have sole control of admission to beds set apart for consumptive patients. Provision of financial assistance to consumptive families should be left under departmental control, as at present.

Endeavour has been again made to obtain suitable land for an industrial colony and a site is likely to be decided upon at any time. Considerable sums of money have been collected by the "Help the Consumptive Fund" and the "Citizen T.B. Association" towards such a colony.

To provide outdoor work at Waterfall for sufficiently recovered patients areas of cultivated land in the gardens have been allocated to their use. These patients work under the direction of the Sanatorium foreman and the institution pays market rates for all vegetables produced. Ten patients are at present working under these conditions and some are doing quite well financially, while so far all have benefited in health. Unfortunately this opportunity of establishing themselves does not appeal to the majority of the patients.

Visiting Dentist.—The appointment in 1925 of a visiting dentist (Mr. W. H. A. Pye) has been of value to the patients, though the full benefit of his visits will not be obvious for some time.

Shortage of Beds.—Owing to the great demand for admission, wards have been continuously overcrowded and the need for additional accommodation is severely felt. The relative number of bed patients has increased, and though three additional nurses and two attendants were appointed great difficulty has been experienced in carrying out necessary treatments.

Juvenile Patients.—The treatment of children has again been very satisfactory. Boys have been removed from the women's division and a special ward has been set apart for them in the men's division. A ward for the boys, quite separate from the adult divisions is needed, as it is undesirable for children to live in close contact with adults in an institution. The girls are kept away from the other patients, as far as is possible under existing conditions.

School has been carried on under the direction of the Education Department, which also provided a piano for the children's use. It is the intention of that Department to erect a school building to give better educational facilities.

Electric Light.—The installation of the electric light was finalised at the end of June and has given every satisfaction; vacuum cleaners have been installed, so that dust from sweeping is now done away with; electric irons are in use; and electric sterilizers are being installed.

Kitchen, Laundry and Hot Water Service.—Extensive alterations to the kitchen were completed; and with the appointment of a fourth cook conditions in the kitchen are quite satisfactory.

Provision of up-to-date laundry facilities is urgent; the laundry gear in use has broken down repeatedly, and even by working many hours overtime the staff is unable to cope with the work. Erection of a new laundry is hoped for early in 1926. The hot water service to the wards also requires improvement, and early attention to it is promised.

Outdoor work and returns from the farm and gardens have been satisfactory; general improvements have been made to the grounds surrounding the Sanatorium, including preparation of a bowling green and croquet lawn.

Dairy.—Unfortunately the institution has not the benefit of a local milk supply; the matter was gone into during the year, but was again postponed on account of the expense involved.

H. W. PALMER,
Medical Superintendent.

Table showing condition of Patients on admission and discharge during year 1925.

Condition on Admission.	*Arrested.	†Much Improved.	‡ Improved.	§Not improved.	Dead.	Total.
Incipient	26	8	2	...	1	37
Moderately early	21	42	47	2	22	134
Moderately advanced	...	65	114	15	76	270
Far advanced	...	...	32	14	59	105
	47	115	195	31	158	546

Ages of Patients Discharged or Deceased during 1925.			
1–9	14	60–69	33
10–19	35	70–79	2
20–29	139	80–89	1
30–39	138		
40–49	112		546
50–59	72		

* *Arrested Cases.*—Have no sign of active disease, temperature normal, no sputum, and able to do a fair amount of work.

† *Much Improved.*—Have slight signs of active disease, temperature normal, with or without sputum, fit for light work.

‡ *Improved.*—Disease more or less active, with various degrees of improvement.

§ *Unimproved.*—Disease progressing or no apparent improvement.

Table showing Yearly Results for the eleven years—1915 to 1925.

Year.	Total Patients under Treatment.		Total Discharges.				Deaths.
	In residence beginning of year.	Admitted during year.	Arrested.	Much Improved.	Improved.	Unimproved.	
1915	316	578	94	138	111	29	176
1916	346	505	83	91	136	45	157
1917	339	465	94	92	104	47	159
1918	308	493	57	67	128	26	173
1919	349	439	59	77	102	17	177
1920	356	480	77	80	112	41	150
1921	376	556	59	107	147	67	190
1922	362	548	63	111	102	114	164
1923	356	569	42	78	159	83	167
1924	396	598	43	70	203	90	192
1925	396	587	47	115	195	31	158

10.—ROOKWOOD STATE HOSPITAL AND ASYLUM FOR MEN.

Report of the Medical Superintendent for the year ended 31st December, 1925.

Honorary Visiting Staff.

Honorary Staff Surgeon, The Hon. J. B. Nash, M.D., M.R.C.S., M.L.C. (died 4–6–25), and succeeded by Ramsay Sharp, M.B., Ch.M.; Honorary Assistant Surgeons, William C. Grey, M.B., Piero Fiaschi, M.R.C.S.E.; Honorary Ear, Throat, and Nose Surgeon, W. A. Dunn, M.R.C.S., Eng.; Honorary Ophthalmic Surgeons, Falconer J. Blaxland, M.D., G. A. Brookes, M.D., B.Sc.; Honorary Neurologist, Andrew Davidson, M.D.

Resident Staff.

Medical Superintendent, R. A. Fox, M.B., Ch.M.; Senior Medical Officer, Dr. E. J. Brooks; Junior Medical Officer, Dr. L. F. Claremont; Manager, A. Lake; Dispenser, W. Lunney; Matron, Miss E. M. E. Mance; Sub-matron, Miss M. C. Brown; Clerk, A. T. Lord; Assistant Clerk, F. L. Carroll.

Constitution of Hospital Staff on 31st December, 1925.

Medical Superintendent, two Resident Medical Officers, Dispenser, Manager, two Clerks, Matron, Sub-matron, twenty-four Nurses, Chief Attendant, Chief Night Attendant, thirty-four Attendants, Ambulance Driver, Storekeeper, Assistant Storekeeper, two Engineers, Foreman, Carpenter, Plumber, Herdsman, two Out-door Attendants, three Cooks, Gardener.

Number of Wards and Beds.

Hospital Division.		General Division.		Total Accommodation.	Number of Beds.
Ward No.	Number of Beds.	Dormitories.	Number of Beds.		
				Hospital Division—	
2	83	5	68	Wards A-I	412
3	63	6	71	,, 2, 3, and 4	191
4	45	7	76	,, Chest Division.........	54
A	50	8	70	,, EP	90
B	50	9	70		
C	50	10	68		747
D	50	20	92		
E	28	21	93	*General Division—*	
F	52	Outside Locations.	42	Dormitories, 5-10	423
G	50			,, 20 and 21	185
H	37			,, Outside locations	42
I	45				
Chest.	54				650
EP.	90				
14	747	8	650	Total	*1,351

* This total does not include 176 stretcher beds (Hospital Division, 93; General, 18) installed to meet urgent demands for additional accommodation.

Admissions and Discharges.

Remaining in on 1st January, 1925, 1,386; admitted during 1925, 3,311; total, 4,697. Discharged, 2,713; died, 587; total, 3,300. Remaining in on 31st December, 1925, 1,397 (Hospital division, 798; dormitories, 599).

Average daily number of persons resident, 1923, 1,487; 1924, 1,485; 1925, 1,485.

Total cost of maintenance and treatment of patients and inmates for 1925, £72,330; average cost per inmate, £48 14s. 1¾d.

Work of Honorary Medical Officers.

The Department is under a deep debt of gratitude to those medical officers who have attended the Institution throughout the year in an honorary capacity and rendered much valuable assistance in the treatment of the patients. The death in April of Hon. Dr. J. B. Nash was deeply regretted.

Hon. Dr. J. B. Nash, as Hon. Surgeon, performed 25 operations between January and March; Dr. W. A. Ramsay Sharp, performed 39 operations; in the Ophthalmic Department, Dr. Falconer J. Blaxland, performed 48 operations; Dr. G. A. Brookes, 59 operations. The Ear, Nose and Throat Department was supervised by Dr. W. A. Dunn, who made 10 visits to the Institution and performed 9 operations. The resident medical staff performed 184 major operations.

Massage Department.—During the year, 313 patients were given treatment, with the following results:—117 recovered, 151 were relieved, 16 unrelieved, and 29 are still receiving treatment. Of the total number treated, 92 took their discharge on recovery.

Recreation for the Inmates.—The installation of a cinema apparatus a few years ago has been the means of providing regular amusement. The apparatus is the property of the Institution, and by the kindness of the Universal Film Manufacturing Co. (Australasia) Ltd., in providing programmes free, an entertainment has been given once a week throughout the year.

In addition to the above, on an average, a first-class concert was given every ten days. The inmates are grateful to the many kind friends who have come, often at much inconvenience to themselves, and provided first-class entertainments.

Diets.—In addition to providing diet in accordance with the approved scale, the medical lists have been sufficiently liberal to include the full requirements of all who were unable to partake of the scale allowance, and, in addition, the general character of the diet has been improved year after year by the addition of increased quantities of freshly grown vegetables.

All green vegetables used are grown on the premises, and the following summary of the quantities produced annually during the past three years will serve to show the progress made in this branch: 1923, 120,444 lb.; 1924, 125,365 lb.; 1925, 164,191 lb.

Farm and Dairy.—An area of about 50 acres is constantly under cultivation for the purpose of providing green fodder for the dairy herd; 286 tons was produced in 1925; 56,698 gallons of milk was obtained, which met all institutional requirements, and allowed a surplus of from 30 to 40 gallons daily to be sent to Waterfall Sanatorium. In the dairy herd the Freisian class predominates, the quality of these pure bred animals being demonstrated by the number of prizes and awards secured by them at the Royal Agricultural Society's Show for some years past. Continued efforts are being made to still further improve the standard of the herd in both the quantity and quality of milk production.

The health of the herd continues good, the result of the last tuberculin test being quite satisfactory.

Piggery.—The new piggery buildings are almost completed, and it is hoped to transfer the pigs to the new sties at an early date. Under the improved conditions much better results should be obtaine in this section.

R. A. FOX,
Medical Superintendent.

11.—LIVERPOOL STATE HOSPITAL AND ASYLUM FOR MEN.

Report of Medical Superintendent for year ended 31st December, 1925.

Honorary Visiting Staff.—Honorary Ear, Nose, and Throat Surgeon, Richard Arthur, M.B., M.L.A.; Honorary Dermatologist, W. A. McDonald, B.A., M.B., Ch.M.; Honorary Medical Officer, J. Pirie, L.R.C.P., L.R.C.S., Edin., L.R.C.P.S., Glas.

Staff.—Medical Superintendent, Donald Wallace, M.A., M.B., Ch.M.; Junior Medical Officer (vacant); Manager, R. J. Brown, transferred to Lidcombe 24th November, 1925, succeeded by A. T. Lord; Acting Dispenser, A. J. Baker; Matron, L. W. MacIntosh; Clerk, E. G. Partridge; Nurses, 11; Attendants, 19; other male staff 8.

Constitution of Hospital Staff on 31st December, 1925.—Medical Superintendent, Manager, Matron, Submatron, Nurses, Clerk, Storekeeper, Dispenser, Engineer, Foreman, Carpenter, Plumber, Gardener, Chief Attendant, 18 Attendants, Baker, and 2 Cooks.

Number of Wards and Beds.

Hospital Division.		General Division.		Total Accommodation.	No. of Beds.
Ward No.	No. of Beds.	Dormitories.	No. of Beds.		
A	29	1	8		
B	29	2	20		
C	25				
D	30	3	25	Hospital Division	296
E	30	4	40		
F	30				
G	28	5	39		
K	10	6	23		
L	10				
M	23	7	39	General Division	254
N	15	8	23		
R	22				
S	15	9	37		
Total—13	296	9	254	Total	550*

*This total does not include 90 stretcher beds installed in dormitories to meet urgent demands for additional accommodation.

Admissions and Discharges for Year ended 31st December, 1925.

Number of persons in residence on 1st January, 1925, 611; admitted, 2,016; total, 2,627; discharged, 1,792; died, 181; in residence on 31st December, 1925, 654. Total cost of maintenance and treatment, £34,826 11s. 6d. Average annual cost per inmate, £54 6s. 7d.

Summary of Patients treated in the various Wards during 1925.

Hospital Section.	In Hospital, 1st January, 1925.	Admitted during year.	Discharged during year.	Died during year.	In Hospital, 31st December, 1925.
Cancer Wards	35	91	37	67	32
Venereal ,,	44	416	421	2	37
General ,,	173	554	448	89	190
Totals	252	1,061	896	158	259
District Ward	19	151	128	23	19
Grand Total	271	1,212	1,024	181	278

Out Patients.—The number of district patients seeking relief in the out-door department shows a definite increase—329—on last year's figures. There were recorded 4,427 attendances, including 2,067 dressings and operations in the district ward. Dr. Pirie, the Hon. Medical Officer, has continued to render valuable service to this department.

Venereal Wards.—The demand for accommodation in these wards was fully maintained. The provisions of the Venereal Diseases Act have been carefully carried out.

Dr. McDonald, Honorary Dermatologist, paid regular visits at intervals of two weeks, thus giving very valuable assistance in the venereal clinic.

Accommodation.—The number of inmates in August attained the grand total of 681, which exceeds by 15 the highest record of any previous year. The new dormitories, with a normal capacity of 100 beds, were completed and occupied towards the end of the year; the recreation hall, in use for several years as a dormitory, has now reverted to its normal purpose.

Accommodation for Nursing Staff.—At present the matron and nursing staff live away from the institution, an inconvenience both to themselves and to the hospital. However, plans are now under consideration for providing quarters in the old Moore College grounds, which have been resumed for that purpose.

Farm and Dairy.—The need for green and uncooked vegetables and fresh unboiled milk as a corrective of the regulation institutional diet has been kept in view in directing the operations of the vegetable garden and dairy. The quantities of these commodities produced during the year show a satisfactory increase.

Urgent Improvements Required.

1. *District Ward.*—It is necessary to emphasise again the urgent need for supplying the ward with suitable lavatory accommodation, bathrooms, &c. Not till then can it function completely as a modern hospital.

2. *Hospital Wards.*—The general hospital accommodation was again severely taxed. All the wards are very poorly equipped; a hot and cold water service throughout is especially a much-needed improvement. Even cold water has to be carried from without, and there are no adequate means for cleansing the hands when attending to patients. As this matter intimately involves the comfort and even the health of the attendants and patients, it cannot be over-emphasised.

3. *Cancer Wards.*—There is a great need for laundry premises, with steam equipment for these wards. The new kitchen was completed in November and is a considerable improvement in this section of the institution. The whole of the main ward has been made fly-proof, thus adding very considerably to the comfort of the patients and their visitors.

D. WALLACE,
Medical Superintendent.

Manager's Review of the Out-door Work for the year ended 31*st December*, 1925.

Satisfactory progress was made with the Outdoor Work, although the continued shortage of inmate workers somewhat militated against more rapid development of the farming section.

Dairy Farm.—The development of the dairy herd has shown satisfactory progress, the supply of milk from Newington being reduced to 20 gallons per day; the herd should fully meet all requirements within six months. The quantity of milk produced was 15,288 gallons, valued at £1,089 8s. 3d. The construction of the herdsman's cottage was delayed owing to shortage of suitable workmen, but it should be completed at an early date. With the growth of the herd, need for the appointment of a herdsman is becoming essential.

Piggery.—This section gave very satisfactory results during the year, sales amounting to £1,077, and pork to the value of £59 was used.

Farm, Vegetable Garden and Orchard.—Green feed to the value of £162 was grown on the farm, thus considerably reducing the cost of fodder. 83,696 lb. of vegetables were grown, valued at £501; the yield of fruit was 8,226 lb., valued at £205 13s.

Bakery.—A very satisfactory year was experienced in the bakery, a high standard of quality being well maintained. The total bread production was 227,214 lb., buns, 187 dozen; total production, based on contract supplies to other similar institutions, amounted to £1,741 3s. 6d., a net saving of £139 4s. 7d.

Condition of Buildings.—All institution buildings were maintained in a reasonable state of efficiency, painting of interior of wards A,B,C, and D, being completed by inmate painters. The need for appointment of a staff painter is urgent.

Garden and Grounds.—The condition of the gardens and grounds has been well maintained, and the work of laying out roads and an ornamental garden in the new dormitoty section is well in hand.

ALBERT T. LORD,
Acting Manager.

12.—NEWINGTON STATE HOSPITAL AND ASYLUM.

Report for the year ended 31st December, 1925.

Visiting Medical Staff.—Honorary Surgeon, Walter A. Sharpe, M.S., F.R.C.S., Edin.; Honorary Ophthalmic Surgeon, Cedric K. Cohen, M.B., M.S.; Honorary Ear, Throat, and Nose Surgeon, Herbert H. Johnston, M.D. Surg., Univ. Syd.; Honorary Neurologist, A. Davidson, M.D.; Visiting Medical Officer, Francis H. Furnival, M.R.C.S., Eng., L.S.A., Lond.

Staff.—Medical Officer, Dr. Lottie Sharfstein; Manager, William Megarvey; Matron, Miss C. M. Dickson; Clerk and Storekeeper, Charles G. Grove; Clerk, Edwin C. Curran; Dispenser, Miss K. Legg.

Constitution of Hospital Staff on 31*st December*, 1925.—Medical Officer, Manager, Matron, Clerk and Storekeeper, Clerk, Dispenser, 23 Nurses, Housekeeper, Seamstress, Cook, Housemaid, two Engineers, Foreman, Blacksmith, Carpenter, Plumber, Herdsman, Gardener, Night Patrol. Mrs. Nichols of Auburn was appointed Dentist, and commenced duty in November.

Admissions and Discharges.—Number of inmates 1st January, 1925, 658; number admitted during year, 1,101; total, 1,759; discharged, 950; died, 160; total, 1,100; remaining on 31st December, 1925, 659. Total cost of maintenance and treatment of patients and inmates for 1925, £27,985 14s. 5d. Average annual cost per inmate £41 9s. 2d.

Number of Wards and Beds.—Hospital Division.—Wards: A, 43 beds; B, 42 beds; C, 10 beds; C2, 10 beds; D, 15 beds; E, 14 beds; F, 51 beds; G, 56 beds; H, 60 beds; H1, 4 beds; J1, 29 beds; J2, 27 beds; Isolation, 12 beds; cottages, 49 beds.

Yard Division.—Dormitories: No. 1, 36 beds; 2, 39 beds; 3, 38 beds; 4, 39 beds; 5, 38 beds; 6, 38 beds; 7, 39 beds; 8, 39 beds.

Total beds.—728 (wards, 422; dormitories, 306).

Hospital Division Summary.—Patients in Hospital on 1st January, 1925, 296; admitted during year, 854; discharged, 743 (recovered, 160; relieved, 370; unrelieved, 52; died, 161).

Classification of Diseases Treated in Hospital.—General diseases, 174; alimentary system, 23; circulatory system, 91; respiratory system, 77; genito-urinary system, 24; nervous system, 95; glands, &c., 111; osseous and arthritic, 4; wounds, &c., 30; Miscellaneous, 4; old-age, 102; not specified, 8; total, 743.

GENERAL.

Staff Changes.—There have been no changes in the medical staff. Miss C. M. Dickson was appointed Matron, vice Miss Jessie McIver transferred to Coast Hospital.

Renovations, &c.—Most of the hospital buildings, dormitories, and the recreation hall have been repaired and painted.

Six new workshops (for trades carried on for the institution) have been erected with reinforced concrete slabs, made by inmate labour from cinders from the local boilers; and a dormitory for male inmate workers is now in course of erection. The cost has been much cheaper than if wood had been used, and a large saving has been effected.

Arrangements have been made with the Sydney Harbour Trust to reclaim about 15 acres of swamp area, which will remove a long standing eyesore and mosquito breeding ground. The work commenced in December, and will take about three months to complete.

The tuberculin test was again applied to the dairy herd, which was found to be free from tuberculosis.

The patients have had a fair share of entertainment during the year. In the winter months dances are held, and in June a fancy dress ball for the inmates was organised by the staff. One hundred inmates attended in fancy dress, and spent a most enjoyable evening.

The "Smith Family" provided a jazz band for the ball, and assisted in making the function a decided success.

Mrs. Heyden of Leichhardt, on Mother's Day, presented each inmate with a small parcel containing useful articles. Mrs. Heyden's action and interest in them is much appreciated by the patients.

The "Smith Family" have taken a keen interest in the institution, and distributed cakes, fruit, and confectionery at Christmas time, and also gave several concerts during the year.

Films for cinema entertainments have been provided free of charge, each fortnight, by the Australian Films, Ltd. Messrs. Williams and Rowe, of Burwood, provide the cinema apparatus, and give the entertainments.

Several other concert parties have visited the institution and have given such pleasure to the inmates.

Farm and Dairy Operations.—Approximate value of vegetables produced, £452; milk, £3,580.

Summary of Revenue Collections.—Revenue collections for the year amounted to £6,001, including sale of cows, calves, &c., £189; sale of pigs, £722; and sale of tallow, £78.

W. MEGARVEY,
Manager.

13.—STATE ASYLUM FOR AGED AND INFIRM MEN, GEORGE-STREET, PARRAMATTA.

Report of the Officer-in-Charge for the year ended 31st December, 1925.

Staff.

Visiting Medical Officer—Dr. W. S. Brown.

Resident Staff—C. A. Warner, Officer-in-Charge. Non-resident Staff—Attendants, 4.

Number of beds in hospital, 39; number of beds in dormitories, 301; total beds, 340.

Admissions and Discharges.—Remaining in institution, 31st December, 1924, 213; admitted during year, 1974; discharged, 2,022; died, 5; remaining in institution on 31st December, 1925, 160. Average daily number, 236. Total cost for year, £7,436 9s. 8d. Average annual cost per inmate, £31 10s. 3d.

Hospital Division.—Number in hospital, 31st December, 1925, 20; admitted during 1925, 78; discharged, 87; died, 5; remaining, 31st December, 1925, 20. Number of visits by Visiting Medical Officer, 279. Inmates seen by the Visiting Medical Officer, 2,541, of whom 335 were transferred to other hospitals for medical treatment.

Lavatory accommodation has been completed adjoining the old messroom to admit of its being used as a dormitory for 30 beds. The general repairs and repainting to buildings have been maintained.

The following articles were made in the tailor's shop:—116 coats, 382 trousers, 138 vests, 249 sheets; 236 pillow-slips, 488 towels.

Regular monthly visits were made by the Senior Attendant at midnight.

The conduct and discharge of duties by the staff was satisfactory.

G. A. WARNER,
Officer-in-Charge.

14.—STATE HOSPITAL AND ASYLUM FOR THE BLIND, AND MEN OF DEFECTIVE SIGHT AND SENILITY, MACQUARIE-STREET, PARRAMATTA.

Staff.

Visiting Medical Officer	Dr. W. S. Brown.
Officer-in-Charge	Mr. H. A. Pyne.

Admissions and Discharges.—Remaining in on 31st December, 1924, 186 ; admitted during 1925, 1,134 ; total, 1,320 ; discharged during 1925, 1,141 ; deaths, 5 ; total, 1,146 ; remaining in on 1st January, 1926, 174. Daily average number resident, 193·8 ; daily average of blind men, 40·95. Total cost of maintenance and treatment of inmates, £5,858 0s. 1d. ; average cost per inmate £30 7s. 2d.

Dental Work.—During the year a much needed dental chair and full equipment was provided by the department, and arrangements made for the regular monthly attendance of a qualified dentist.

Bakery.—Malt bread, currant and seed cake was made in the institution, the output totalling 1,042,028 lb. of bread and 45,707 lb. of cake, the whole of which was distributed to the State Hospitals at Waterfall, Rookwood, Newington and George-street and Macquarie-street Asylums. Seven hundred dozen of buns was also distributed at Easter to the same institutions.

General.—Inmate clothing, bedding, &c., with the exception of boots and hats are made in the institution by inmate labour and all carpentry work, repairs to buildings, painting, bricklaying, &c., are carried out under the supervision of the Officer-in-Charge.

The Visiting Medical Officer attended the institution on 237 occasions.

H. PYNE,
Officer-in-Charge.

15. Table I.—Summary Statement of Expenditure :—Montrose Maternity Hospital, Fernleigh Rest Home, Lady Edeline Hospital for Babies, and Carrara and Denistone Convalescent Homes, for the year ended 31st December, 1925.

Head of Expenditure.	Montrose Maternity Hospital.	Fernleigh Rest Home.	Lady Edeline Hospital.	Carrara Convalescent Hospital.	Denistone Convalescent Hospital.	Totals.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries	883 0 0	819 0 0	1,144 0 0	968 0 0	841 0 0	4,655 0 0
Gratuities	39 0 0	19 0 0	136 0 0	144 0 0	181 0 0	519 0 0
Provisions	483 0 0	472 0 0	978 0 0	989 0 0	770 0 0	3,692 0 0
Insurance	4 0 0	3 0 0	6 0 0	4 0 0	5 0 0	22 0 0
Telephone	28 0 0	9 0 0	28 0 0	20 0 0	24 0 0	109 0 0
Stimulants	10 0 0	5 0 0	12 0 0	11 0 0	10 0 0	48 0 0
Drugs	38 0 0	15 0 0	65 0 0	30 0 0	25 0 0	173 0 0
Disinfectants	8 0 0	4 0 0	9 0 0	8 0 0	10 0 0	39 0 0
Fuel	53 0 0	51 0 0	154 0 0	112 0 0	79 0 0	449 0 0
Light	47 0 0	40 0 0	153 0 0	86 0 0	58 0 0	384 0 0
Hardware	11 0 0	9 0 0	36 0 0	19 0 0	22 0 0	97 0 0
Clothing, &c.	28 0 0	15 0 0	20 0 0	60 0 0	50 0 0	173 0 0
Cows and horses	....	....	....	10 0 0	8 0 0	18 0 0
Travelling expenses, &c.	11 0 0	18 0 0	24 0 0	8 0 0	9 0 0	70 0 0
Repairs, &c.	28 0 0	21 0 0	37 0 0	48 0 0	24 0 0	158 0 0
Postage	6 0 0	3 0 0	6 0 0	5 0 0	5 0 0	25 0 0
Forage	....	....	....	140 0 0	146 0 0	286 0 0
Sundries	13 0 0	15 0 0	31 0 0	28 0 0	32 0 0	119 0 0
Total	1,690 0 0	1,518 0 0	2,839 0 0	2,690 0 0	2,299 0 0	11,036 0 0
Average daily number of patients	7	9	29	33	21	99
Average cost per occupied bed £	241 8 7	168 13 4	95 18 3	81 10 4	109 9 6	111 9 6

15. TABLE II.—SUMMARY STATEMENT of Expenditure, State Hospitals and Asylums of Rookwood, Liverpool, and Newington, Parramatta Homes (George-street and Macquarie-street), and Waterfall Sanatorium, for the year ended 31st December, 1925.

Head of Expenditure.	Rookwood.	Liverpool.	Newington.	Waterfall Sanatorium.	Parramatta.		Total.
					George-street.	Macquarie-street.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries, Wages, and Gratuities (including expenses of Administration)	24,992 13 10	15,774 11 7	10,836 14 2	13,236 5 4	2,116 3 1	1,687 3 1	68,643 12 1
Provisions	27,385 16 3	9,619 12 10	6,587 11 9	16,253 15 7	3,013 10 10	3,132 4 7	65,992 11 10
Alcohol	843 11 8	114 16 9	85 14 4	41 12 6	....	....	1,085 15 3
Drugs and Surgical Appliances	2,644 8 8	1,005 10 10	859 13 9	519 15 0	1 16 1	29 13 0	5,060 17 4
Disinfectants	24 9 2	50 16 8	8 19 10	8 3 9	10 0 6	3 0 4	105 10 3
Fuel	3,057 4 9	519 6 1	2,142 3 1	879 14 10	151 6 4	137 9 0	6,887 4 1
Light	943 4 1	497 7 6	28 14 5	439 6 2	69 10 6	80 4 7	2,058 7 3
Water	776 8 8	249 5 10	719 16 6	1,066 15 0	5 15 6	3 2 8	2,821 4 2
Burials (including ground fees)	289 9 0	139 4 4	32 15 0	21 10 0	2 10 0	2 10 0	487 18 4
Hardware	1,662 3 2	284 8 9	749 15 6	1,056 19 2	104 14 5	205 6 10	4,063 7 10
Clothing, Linen, Blankets, &c.	5,936 6 10	2,696 2 7	1,960 19 6	2,850 6 9	912 4 2	538 15 8	14,894 15 6
Fodder purchased	3,773 14 6	1,302 3 8	2,893 1 11	367 16 8	59 18 4	....	8,396 15 1
Poultry	....	....	73 6 11	....	....	....	73 6 11
Horses and Cows, &c.	143 19 2	89 0 6	....	70 16 8	....	....	303 16 4
Furniture, Railway Expenses, &c.	584 1 5	1,548 8 1	1,600 1 4	197 18 3	252 11 7	225 11 1	4,408 11 9
Repairs and Maintenance of Buildings	778 9 11	1,304 3 5	229 18 5	265 17 2	103 8 2	62 10 1	2,744 7 2
Printing, Stationery, and Postage	260 19 4	52 9 2	57 3 3	74 15 9	22 12 0	5 6 6	473 6 0
Sundries	226 16 0	324 12 0	586 18 0	299 12 9	174 13 4	64 7 3	1,676 19 4
Total	74,323 16 5	35,572 0 7	29,453 7 8	37,651 2 4	7,000 14 10	6,177 4 8	190,178 6 6
Stock on hand 31st December, 1924	7,856 15 3	5,676 9 2½	3,227 18 9	2,402 1 7	1,013 0 9	692 2 6	20,868 8 0½
Adjustment of Exchange	432 12 9	795 3 9	2,073 18 9	....	1,240 1 9	290 5 11	4,832 2 11
Grand Total	82,613 4 5	42,043 13 6½	34,755 5 2	40,053 3 11	9,253 17 4	7,159 13 1	215,878 17 5½
Deduct—							
Proceeds of Sales	1,579 14 3	1,603 4 1	1,222 11 1	484 15 2	134 7 9	263 10 9	5,288 3 1
Stock on hand 31st December, 1925	7,966 9 10	5,563 0 11	3,186 16 2	2,685 9 2	1,294 7 9	758 14 0	21,454 17 10
Adjustment of Exchange	737 0 0	59 17 0	2,360 3 6	1,351 13 3	388 12 2	279 8 3	5,167 14 2
Total Deductions	10,283 4 1	7,217 2 0	6,769 10 9	4,521 17 7	1,817 7 8	1,301 13 0	31,910 15 1
Total Cost	72,330 0 4	34,826 11 6½	27,985 14 5	35,531 6 4	7,436 9 8	5,858 0 1	183,968 2 4½
Average daily population	1,485	641	675	529	236	193	3,759
Average annual cost per inmate ... £	48 14 1¾	54 6 7½	41 9 2	67 3 4	31 10 3	30 7 2	48 18 10
Annual contributions towards maintenance ... £	3,188 2 4	2,932 14 9	4,919 2 0	1,717 19 0	555 3 3	1,655 14 9	14,968 16 1

SECTION IV.

Sixteenth Report of the Microbiological Laboratory (Government Bureau of Microbiology) for the Year 1925.

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SECTION IV.

Sixteenth Report of the Microbiological Laboratory (Government Bureau of Microbiology) for the year 1925.

The Principal Microbiologist to The Director-General of Public Health.

Sir,

I have the honour to submit for your information the accompanying report of the work performed in the Microbiological Laboratory. The steady increase in the work noted in the last annual report has continued, and I have again to record a marked increase in the number of examinations—25,344 as against 23,990 in 1924.

As in later years this increase has been largely in the serological examinations for venereal diseases, though as will be seen from the detailed figures there has been increase in other lines of work, notably in the examination of tissues and in the preparation of vaccines. Examinations for infectious diseases, on the other hand, show a decrease.

Plague.—No case of plague occurred during the year, nor were any infected animals found. The routine examinations of rats was continued, but the numbers examined show a decided decrease—12,019, as against 16,351 in 1924.

Diphtheria.—There was a marked decrease in the number of swabbings submitted for examination; this was due to the fact that the disease was less prevalent than in preceding years; the number of notifications for diphtheria during the year (2,778) was the lowest recorded since 1909 (2,419). Schick tests were continued and approximately an equal number of children tested. Schick campaigns would be extended, but for the inability of the present staff to cope with additional work of this nature. The results of the campaigns carried out during 1925 are shown in a special report (p. 179); the towns visited during the year were Coonamble, Gulargambone, Quambone, Narrabri, Cowra and Corowa.

Tuberculosis.—The examinations of sputa for the presence of tubercle bacilli (2,783) show a slight decrease on the figures for 1924 (2,881).

Venereal Disease—Syphilis.—The serological tests for syphilis show a marked increase for 1925. The Wassermann reaction was carried out on 5,186 sera as against 3,684 in 1924. In addition, the use of the Kahn Flocculation Test was extended and was found to be of value both as a check on the Wassermann reaction and for detecting evidences of infection which were not revealed by the Wassermann reaction; the test was particularly valuable in ascertaining the point of cure in treated cases.

Gonorrhœa.—The figures both for the examination of smears for gonococci and for the complement deviation test show slight increases.

Typhoid.—As in the case of diphtheria, there was a decided decrease in the incidence of typhoid in the State in 1925. The number of notifications dropped from 768 in 1924 to 533 in 1925. The laboratory work, however, shows a much smaller decrease (882, as against 914) owing partly to the investigation of carrier cases and partly to the extension of the practice of testing the stools of typhoid patients before discharge from hospital. A special investigation was made into the occurrence of typhoid at Broken Hill and a report of this investigation appears elsewhere (p. 41).

Anthrax.—Three cases due to shaving brush infection occurred in 1925. In all instances the infected brush had been in the State for some considerable time. These cases have been made the subject of a fifth report on anthrax and shaving brushes (p. 171).

Bio-chemical Work.—The bio-chemist has been fully occupied throughout the year. As in the preceding year, a large proportion of the work has been the estimation of blood sugar in cases of diabetes. This test has an important bearing on the exhibition of insulin.

Pathological Tissues.—The examination of tissues for malignant disease or other pathological change continued to increase, thus there were 1,141 tissues submitted for section in 1925, as against 963 in 1924; malignant disease was diagnosed in 356 tissues.

Vaccines.—The demand for autogenous vaccines from sputa, urine, pustules, &c., continued, and 865 vaccines were prepared during the year. Reports received from medical practitioners speak highly of the results achieved by the use of these preparations.

Hygienic Examinations.—Fewer food samples were examined and the milk testing was not continued On the other hand, a fairly extensive series of water examinations were carried out; these were mainly done for the Public Works Department in connection with the water supplies of inland towns. The tests are being continued and will be made the subject of a report at a later date.

Food Poisoning.—An extensive outbreak of food poisoning occurred in a Girls' Home at Glebe Point in November, due to a member of the Salmonella group, which was isolated from the stools of a number of the patients. As similar outbreaks occur annually in the State, it has been thought advisable to collect together the investigations carried out into a number of these outbreaks, and they are made the subject of a special report (p. 181).

Staff Changes.—Mr. Snell was appointed as a Laboratory Assistant on 1st July, 1925. Miss Durie was transferred to the office of the Medical Officer of Health, Hunter River Combined District at Newcastle in August, 1925. Miss Jessie Fort, typist, was appointed in November.

The steady increase of work from year to year has not been accompanied by increase in the staff, commensurate with the extra work. The need for an assistant to the officer in charge of the serological work became acute in 1925 and application was made for the appointment of an additional Assistant Microbiologist. An additional attendant is also urgently required and further clerical assistance is necessary.

Under present conditions practically the whole time of the laboratory staff is occupied with routine duties, and investigational work has been necessarily curtailed. If the department is to expand along its proper channels and to undertake the investigation of problems of public health importance further increases of staff will have to be made. The diphtheria prevention work could then be greatly expanded and it would also be possible to undertake scarlet fever prevention.

Accommodation.—No relief has been afforded in the matter of laboratory accommodation. The need for a new building is more urgently felt each year; apart from the congestion, the erection of an eight-storey building on the opposite side of Albert-street now in progress will interfere greatly with the light and add to the difficulties of the work.

I have again to acknowledge my indebtedness to the staff, both laboratory and clerical, for their willing co-operation in carrying out the duties of the laboratory.

Yours, &c.,

EUSTACE W. FERGUSON,
Principal Microbiologist.

Staff.

Principal Microbiologist: Eustace William Ferguson, M.B., Ch.M.

Assistant Microbiologists: Ernest Leslie Morgan, M.B., Ch.M.; Elsie Jean Dalyell, M.B.; Robert Grant, F.C.S.; Ethel C. Pinkerton, B.Sc.

Laboratory Assistants: Austin Burton Duffy (Senior Assistant); John Owen Sergeant; James Flynn; John Downie Stanners; Henry Aldrech Gotto; Arthur James Williamson; L. H. Snell (Junior Assistant).

Laboratory Attendants: Frederick C. Calf; Alfred Anderson; Edward Douthwaite.

Clerical Staff: Florence Stuart Wearne, Clerk and Librarian; Hazel E. Andrews, Daphne I. Saunders, Jessie Fort, Shorthand-writers and Typistes; Henry Penson, Temporary Messenger.

1925.—Part I.—Table showing the Routine Examinations made for the Various Branches of the State Department of Public Health, other Government Departments, Subsidised Hospitals, &c.

	Number of Examinations. Comparative Statement.	
Department of Public Health—	1924.	1925.
Microbiological Laboratory	13,625	15,981
Coast Hospital	2,330	2,535
Liverpool State Hospital	984	1,254
Macquarie-street Asylum, Parramatta	....	1
Newington State Hospital	102	59
Rookwood State Hospital	660	487
Commonwealth Government	484	145
State Departments—		
Agriculture and Stock	72	2
Chief Secretary (Fisheries)	3	4
Education Department	264	34
Police Department	50	34
Prisons (Long Bay Gaol, &c.)	243	281
Public Works	....	79
Railways and Tramways	18	8
Stores Supply Department	34	37
Public Hospitals and Institutions other than State Hospitals	4,262	4,391
Municipal and Shire Councils	720	9
Silicosis Commission	133	....
Zoological Gardens	6	3
	23,990	25,344

Total Examinations—	1924.	1925.
General	23,990	25,344
Rats for Plague	16,351	12,019
Grand Total	40,341	37,363

In the following Statement the Routine Work is divided into sections to disclose the purposes for which the various examinations were made :—

A.—*Microbiological Examinations.*	Number of Examinations. Comparative Statement.			
1. Of material from diseased persons and animals—	1924.		1925.	
Actinomycosis	7		3	
Bilharzia	......		10	
Blastomycosis	......		2	
Diphtheria (swabbings)	5,779		2,848	
,, (toxicity tests)	267		240	
,, (Schick tests)	1,137		1,056	
Dysentery	1		7	
Food Poisoning Cases	36		10	
Gonorrhœa	2,261		2,487	
,, (Complement Deviation Test for)	1,265		1,585	
Hookworm	10		15	
Hydatids	58		70	
Kala-Azar	......		1	
Leprosy	10		5	
Malaria	16		17	
Meningitis	24		23	
Mastitis (Bovine)	3		......	
Smallpox	......		1	
Syphilis (Wassermann Reactions)	3,684		5,186	
,, (Kahn's Flocculation Test for)	......		2,060	
,, (Spirochaetes)	10		16	
Tetanus	1		2	
Tinea	5		3	
Tuberculosis	2,881		2,783	
Typhoid	914		882	
Unclassified "No growths," from Pus, &c.	549		690	
Whooping Cough	......		1	
		18,908		20,003
2. Examinations for Anthrax—				
Human beings	5		8	
Shaving Brushes	9		11	
Animals (Sheep, Cattle, &c.)	......		1	
		14		20
3. Of Materials, &c.—				
Disinfectants	45		100	
Sewage, effluents, &c.	4		4	
Water	31		109	
		80		213

	Number of Examinations. Comparative Statement.			
	1924.		1925.	
Brought Forward	......	19,002	......	20,236
A.—Microbiological Examinations—(continued.)—				
4. Examinations of Foods for bacterial contamination—				
Brines	8		......	
Egg Pulp	6		......	
Dough and Yeast...	8		......	
Fish and fish pastes	7		2	
Flour	9		4	
Ice Cream	16		......	
Margarine	8		......	
Meat	......		1	
Milk samples from suburban dairies for T.B. and bacterial contents	112		55	
Milk (tinned)	4		......	
Oysters	2		3	
Pickles	5		1	
Tomato Sauce	15		......	
Vinegar	......		4	
		200		70
B.—Pathological Examinations.				
1. Of Animals—				
Mammals	7		10	
Birds	4		2	
Fish	......		1	
		11		13
2. Of Body Fluids, etc.—				
Blood for full and differential count	341		353	
Blood and Urine (for urea, sugar, &c.)	359		434	
Urine—General Examinations	605		786	
Fæces	79		54	
Test Meal	1		......	
Calculus	......		1	
		1,385		1,623
3. Tissues—				
Malignant Tumours	322		356	
Tubercular	7		4	
Other Conditions	634		781	
		963		1,141
C.—Examination of Parasites.				
Ecto-parasites (fleas, ticks, etc.)	1,508		1,327	
Endo-parasites (round and flat worms)	......		8	
Insects (including flies and mosquitoes) and spiders	105		9	
		1,613		1,344
D.—Medico-Legal Examinations.				
Examination of Exhibits for—				
Blood stains	24		10	
Gonococci	4		3	
Seminal stains	20		20	
Spermatozoa	7		10	
Other examinations	......		1	
		55		44
E.—Examination of Specimens for preparation of Vaccines.				
Preparation of Autogenous Vaccines from sputa, urine, acne pustules, boils, wounds, and other septic conditions	761		865	
Preparation of stocks of anti-sera for medico-legal tests, etc	......		1	
Examination of calf lymph	......		2	
		761		868
Total	23,990		25,344	

F.—*Examination of Rats and Mice for Plague.*

Comparative Statement.

Rats Received from Rat-catching Staff of—	1924.				1925.			
	Rats.	Mice.	Total.	No. Infected.	Rats.	Mice.	Total.	No. Infected.
Department of Public Health	2,066	732	2,798	...	1,702	614	2,316	...
City Council of Sydney ...	2,876	316	3,192	...	1,645	82	1,727	...
Sydney Harbour Trust ...	4,654	2,022	6,676	...	·4,384	1,615	5,999	...
Garden Island	170	30	200	...	210	22	262	...
Federal Quarantine Department	2,833	382	3,215	...	1,149	79	1,228	... ...
Other sources	251	10	261	...	468	19	487	...
	12,850	3,501	16,351	...	9,588	2,431	12,019	...

PART II.—REPORTS OF INVESTIGATIONAL WORK, 1925.

1.—ROUTINE EXAMINATION OF RODENTS AND THEIR ECTOPARASITES.

(E. W. Ferguson.)

The routine examination of rats for the presence of plague was continued. These examinations have been carried out with two short breaks since 1900.

In 1925 no infected animals were found. The number of rats caught and examined has steadily decreased since 1922, with the freedom of the city from plague. In 1920, 6,667 were examined; in 1921, 16,633; 1922, 30,038; 1923, 19,176; 1924, 16,351; 1925, 12,019.

Species of Fleas.—It will be seen that the fleas collected were determined as belonging to five species:—*Xenopsylla cheopis* (304); *Ctenopsylla musculi* (689); *Ceratophyllus fasciatus* (309); *Ctenocephalus felis* (*or canis*) (2); and *Pulex irritans* (4); Total, 1,308.

Table I.—Showing the number and species of Rats examined each week during 1925, and the number and species of Fleas collected on them.

1925. Week ended—	Species of Rats examined.				No. infected with plague.	Species of Fleas and Hosts on which they were found.																				Total No. of Fleas collected.
						Xenopsylla cheopis.				*Ctenopsylla musculi.*				*Ceratophyllus fasciatus.*				*Ctenocephalus felis or canis.*				*Pulex irritans.*				
	R. norvegicus.	*R. rattus.*	*M. musculus.*	Total.		*R. norvegicus.*	*R. rattus.*	*M. musculus.*	Total.	*R. norvegicus.*	*R. rattus.*	*M. musculus.*	Total.	*R. norvegicus.*	*R. rattus.*	*M. musculus.*	Total	*R. norvegicus.*	*R. rattus.*	*M. musculus.*	Total.	*R. norvegicus.*	*R. rattus.*	*M. musculus.*	Total.	
3 January	2	7	3	12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10 ,,	18	240	36	294	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17 ,,	35	153	37	225	...	2	4	...	6	4	3	...	7	6	2	...	8	...	...	...	...	...	...	...	...	21
24 ,,	29	191	26	246	...	...	...	...	...	...	7	...	7	...	3	...	3	...	...	...	...	...	...	...	...	10
31 ,,	7	187	32	226	...	...	2	...	2	...	13	...	13	...	6	...	6	...	1	...	1	...	...	...	...	22
7 February	32	156	30	218	...	...	12	...	12	...	10	...	10	...	4	...	4	...	...	...	...	...	...	...	...	26
14 ,,	23	163	46	232	...	...	3	...	3	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	5
21 ,,	35	96	25	156	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28 ,,	26	156	38	220	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7 March	49	152	37	238	...	2	5	...	7	1	7	...	8	...	10	...	10	...	...	...	...	...	...	...	...	25
14 ,,	76	98	41	215	...	...	8	...	8	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	10
21 ,,	30	239	53	322	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28 ,,	26	203	53	282	...	...	11	...	11	...	1	...	1	...	1	...	1	...	...	...	...	...	...	...	...	13
4 April	18	134	65	217	...	...	3	...	3	...	12	...	12	...	3	...	3	...	...	...	...	...	...	...	...	18
11 ,,	13	128	53	194	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18 ,,	31	113	35	179	...	3	...	...	3	9	...	...	9	...	...	...	...	...	...	...	...	...	...	...	...	12
25 ,,	41	133	61	235	...	2	5	...	7	9	4	...	13	1	1	...	2	...	...	...	...	...	...	...	...	22
2 May	25	148	117	290	...	...	2	...	2	...	9	...	9	...	2	...	2	...	...	...	...	...	...	...	...	13
9 ,,	35	252	48	335	...	...	16	...	16	...	13	...	13	...	5	...	5	...	...	...	...	...	...	...	...	34
16 ,,	64	215	65	344	...	27	11	...	38	7	17	...	24	1	5	...	6	...	...	...	...	...	...	...	...	68
23 ,,	63	175	76	314	...	...	10	...	10	...	43	...	43	...	2	...	2	...	...	...	...	...	...	...	...	55
30 ,,	51	180	50	281	...	20	10	...	30	2	18	...	20	2	5	...	7	...	...	...	...	...	...	...	...	57
6 June	24	161	57	242	...	...	3	...	3	...	16	...	16	...	12	...	12	...	...	...	...	...	...	...	...	31
13 ,,	24	158	59	241	...	...	8	...	8	...	25	...	25	...	76	...	76	...	...	...	...	...	...	...	...	109
20 ,,	19	254	44	317	...	...	9	...	9	...	18	...	18	...	3	...	3	...	...	...	...	...	...	...	...	30
27 ,,	21	193	60	274	...	...	2	...	2	...	96	...	96	...	32	...	32	...	...	...	...	...	...	...	...	130
4 July	22	240	71	333	...	...	5	...	5	...	40	...	40	...	5	...	5	...	...	...	...	...	...	...	...	50
11 ,,	65	203	64	332	...	...	...	...	...	...	3	...	3	...	3	...	3	...	...	...	...	...	...	...	...	6
18 ,,	36	172	51	259	...	12	3	...	15	21	6	...	27	5	11	...	16	...	...	...	...	...	...	...	...	58
25 ,,	16	112	61	189	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1 August	14	105	88	207	...	...	10	...	10	...	15	...	15	...	8	...	8	...	...	...	...	...	...	...	...	33
8 ,,	53	154	71	278	...	...	11	...	11	5	43	...	48	6	16	...	22	...	...	...	...	...	...	...	...	81
15 ,,	40	126	48	214	...	4	17	...	21	7	51	...	58	2	6	...	8	...	...	...	...	...	...	...	...	87
22 ,,	29	223	71	323	...	...	7	...	7	...	10	...	10	...	3	...	3	...	...	...	...	...	...	...	...	20
29 ,,	46	155	60	261	...	...	4	...	4	...	10	...	10	...	8	...	8	...	...	...	...	...	...	...	...	22
5 September	31	106	35	172	...	...	2	...	2	...	22	...	22	...	7	...	7	...	...	...	...	...	...	...	...	31
12 ,,	12	139	57	208	...	...	5	...	5	...	22	...	22	...	1	...	1	...	...	...	...	...	...	...	...	28
19 ,,	17	107	40	164	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26 ,,	23	210	53	286	...	...	...	...	...	...	14	...	14	...	3	...	3	...	...	...	...	...	...	...	...	17
3 October	26	278	52	356	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10 ,,	42	149	18	209	...	...	10	...	10	...	15	...	15	...	...	...	...	...	...	...	...	...	...	...	...	25
17 ,,	28	182	34	244	...	...	1	...	1	...	26	...	26	...	4	...	4	...	...	...	...	...	...	...	...	31
24 ,,	51	71	47	169	...	2	...	...	2	6	...	...	6	4	...	...	4	...	...	...	...	...	...	...	...	12
31 ,,	45	120	59	224	...	...	3	...	3	...	5	...	5	...	12	...	12	...	...	...	...	...	4	...	4	24
7 November	15	127	45	187	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14 ,,	7	133	22	162	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21 ,,	20	97	13	130	...	...	1	...	1	...	11	...	11	...	7	...	7	...	...	...	...	...	...	...	...	19
28 ,,	25	80	25	130	...	...	17	...	17	...	2	...	2	...	7	...	7	...	1	...	1	...	...	...	...	27
5 December	20	145	24	189	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12 ,,	18	129	32	179	...	...	5	...	5	...	5	...	5	...	6	...	6	...	...	...	...	...	...	...	...	16
19 ,,	6	123	27	156	...	...	5	...	5	...	2	...	2	...	3	...	3	...	...	...	...	...	...	...	...	10
26 ,,	2	64	15	81	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27 to 31 December	3	24	1	28	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	1,529	8,059	2,431	12,019	...	74	230	...	304	71	618	...	689	27	282	...	309	...	2	...	2	...	4	...	4	1,308

TABLE II.—Showing the numbers of Rats and Mice examined each month and the seasonal variation in the species of Fleas infesting them. The accompanying graph shows the seasonal prevalence for the period 1909–25.

1925. Month.	Cases in human beings.	Species of Rats.				No. plague infected.	No. of Fleas collected.	*Xenopsylla cheopis.*		*Ctenopsylla musculi.*		*Ceratophyllus fasciatus.*		*Ctenocephalus canis or felis.*		*Pulex irritans.*	
		R. norvegicus.	*R. rattus.*	*M. musculus.*	Total.			Gross.	Per 1,000 Rats.	Gross.	Per 1,000 Rats.	Gross.	Per 1,000 Rats.	Gross.	Per 1,000 Rats.	Gross.	Per 1,000 Rats.
January	...	91	778	134	1,003	...	53	8	7·97	27	26·91	17	16·94	1	·99	...	...
February	...	116	571	139	826	...	31	15	18·15	12	14·52	4	4·84	...	...	...	...
March	...	188	753	204	1,145	...	48	26	22·7	11	9·6	11	9·6	...	...	...	...
April	...	112	541	295	948	...	52	13	13·71	34	35·86	5	5·27	...	...	...	...
May	...	222	876	255	1,353	...	227	96	70·95	109	80·56	22	16·26	...	...	...	...
June	...	100	877	241	1,218	...	300	22	16·09	155	126·66	123	100·98	...	...	...	...
July	...	140	716	308	1,164	...	114	20	17·18	70	60·13	24	20·61	...	...	...	...
August	...	177	678	262	1,117	...	243	53	47·44	141	126·23	49	43·86	...	...	...	...
September	...	92	642	209	943	...	76	7	7·42	58	61·5	11	11·66	...	...	...	...
October	...	175	705	180	1,060	...	92	16	15·09	52	49·05	20	18·86	...	...	4	3·77
November	...	68	448	110	626	...	46	18	28·49	13	20·76	14	22·36	1	1·59	...	...
December	...	48	474	94	616	...	26	10	16·23	7	11·36	9	14·61	...	...	...	...
	...	1,529	8,059	2,431	12,019	...	1,308	304	25·29	689	57·32	309	25·70	2	16	4	·33

TABLE III.—Showing the number of Rats annually examined from the first appearance of plague at Sydney in 1900 to 31st December, 1925.

Year.	Period of Rat Examination.	Rats examined.				Mice examined.			Infected.							Percentage of infected to total examined.		
		Norvegicus.	Per cent.	*Rattus.*	Per cent.	*Musculus.*	Per cent.	Total examined	*Norvegicus.*	Per cent.	*Rattus.*	Per cent.	*Musculus.*	Per cent.	Total infected.	N.	R.	M.
1900 1901 1902	....	......	.....	*1900—First plague outbreak, 19th January to 9th August. *1901–2—Second plague outbreak, 12th Nov., 1901, to 8th June, 1902.														
1903	1st May to 15th Aug.	8,695	...	...	...	5,976	...	14,761	Rats. 111	...	...	...	Mice. 50	...	161	...	...	...
1904	1st Mar. to 3rd Dec.	12,169	27·76	8,225	18·76	23,428	53·48	43,822	108	44·26	73	29·92	62	25·41	243	·76	1·16	0·26
1905	Year.	11,383	53·72	5,681	17·81	14,831	46·47	31,895	78	55·32	45	31·91	18	12·77	141	·79	·88	·13
1906	„	9,275	31·49	8,694	29·52	11,478	38·97	29,447	46	26·44	89	51·15	39	22·41	174	·49	1·02	·34
1907	„	8,628	27·2	10,749	33·9	12,244	38·7	31,621	57	26·03	143	65·29	19	8·68	219	·66	1·3	·15
1908	„	7,622	28·39	9,207	34·29	10,020	37·32	26,849	82	46·86	78	44·57	15	8·57	175	1·075	·84	·14
1909	„	6,752	25·26	11,259	42·08	8,726	32·66	26,737	22	12·36	138	77·53	18	10·11	178	·32	·22	2·06
1910	„	5,701	24·98	10,076	44·15	7,044	30·87	22,821	4	80·	1	20·	...	...	5	·07	1·00	...
1911	„	6,025	26·45	10,830	47·55	5,919	26·	22,774	...	...	...	...	...	...	...	...	...	...
1912	„	6,510	37·82	7,922	46·18	2,722	16·	17,154	...	...	...	...	...	...	...	...	...	...
†1913	„	5,020	47·29	5,477	51·59	118	1·1	10,615	...	..	...	...	...	...	...	...	...	...
1914	„	3,732	39·58	5,487	58·14	220	2·33	9,439	...	...	...	...	...	...	...	...	...	...
1915	„	3,592	37·13	5,946	61·48	135	1·89	9,673	..	...	...	...	...	...	...	...	...	...
1916	„	2,807	35·33	4,967	62·58	167	2·1	7,941	...	...	...	...	...	...	...	...	...	...
1917	„	3,026	36·76	5,110	62·08	95	1·15	8,231	...	...	...	...	...	...	...	...	...	...
1918	„	2,601	33·43	5,109	65·67	69	·88	7,779	...	...	...	...	...	...	...	...	...	...
‡1919	„	849	26·82	2,303	72·76	13	·41	3,165	...	...	...	...	...	...	...	...	...	...
1920	„	2,707	40·6	3,960	59·4	...	...	6,667	...	...	...	...	...	...	...	...	...	...
1921	„	5,588	33·59	10,270	61·74	775	4·59	16,633	24	38·71	37	59·67	1	1·61	62	·42	·36	·12
1922	„	8,433	28·09	12,822	42·68	8,783	29·25	30,038	43	50·6	13	33·73	13	15·67	86§	·50	·23	·14
1923	„	3,749	19·55	10,147	52·91	5,280	27·53	19,176	...	...	...	...	...	...	...	...	...	...
1924	„	1,896	11·59	10,954	66·99	3,501	21·41	16,351	...	...	...	...	...	...	...	...	...	...
1925	„	1,529	12·72	8,059	67·05	2,431	20·23	12,019	...	...	...	...	...	...	...	...	...	...
	Total ...	119,594	29·11	173,254	42.17	117,999	28·72	410,847	464	36·17	634	49·37	185	14·45	1,283	·41	·43	·17

* Destroyed 1900–1902, 215,286. No record was kept during this period of the actual number of rats examined, but they all belonged to one of two species—*R. norvegicus* and *R. rattus*. The infected specimens were all *R. norvegicus*. Of the 215,286 rats destroyed between 1900 and 1902 there were about an equal number of each species, *R. rattus* predominating along the wharf area, and *R. norvegicus* inland.

† Examination of rats was suspended during the months of August, September, and October, owing to an outbreak of smallpox.

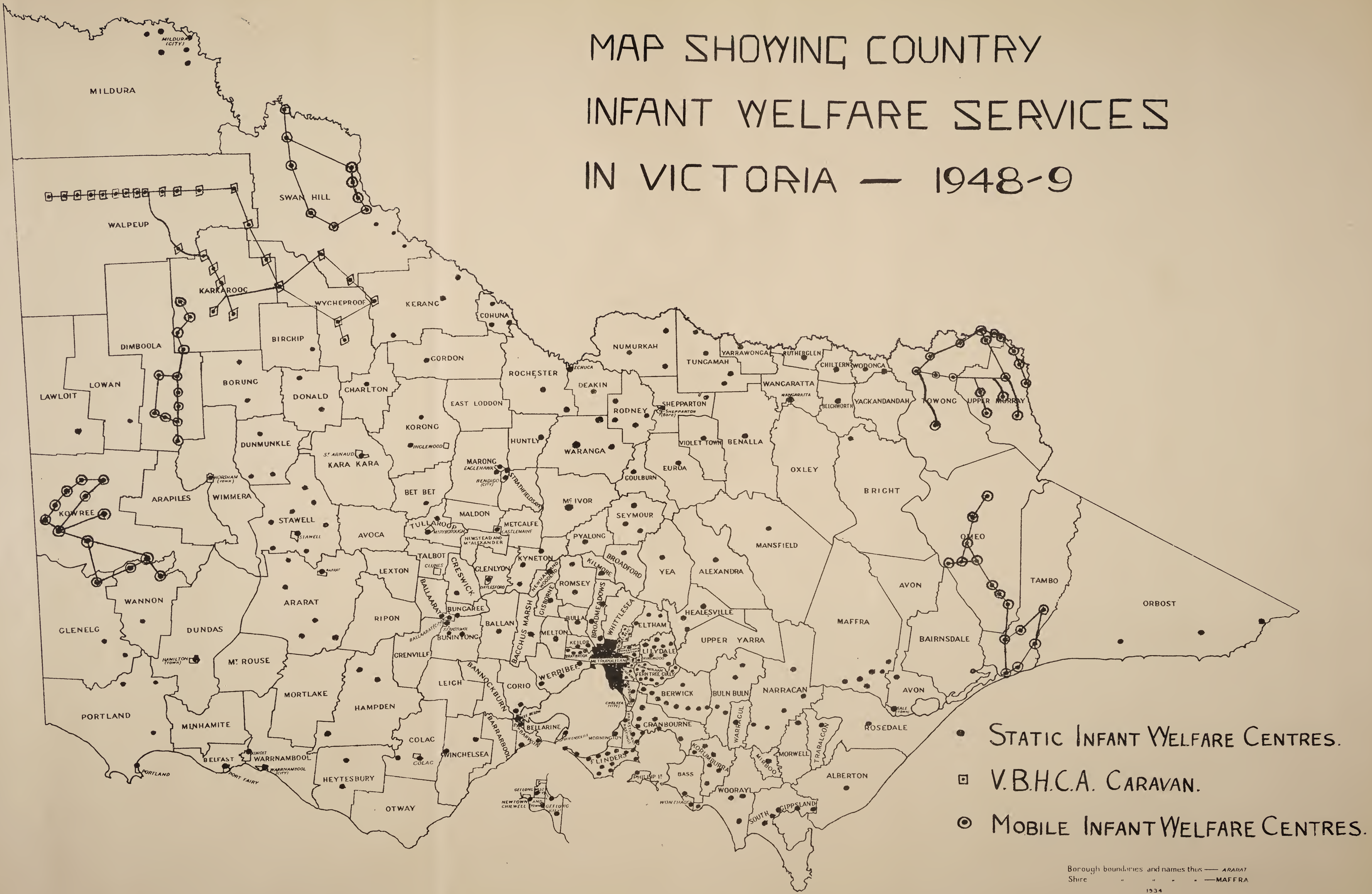
‡ Examination of rats was greatly curtailed owing to the influenza epidemic

§ 89 Plague infected animals were found, comprising 86 rats and mice, 2 cats, and 1 guinea-pig.

TABLE showing Sex Incidence of Rats and Mice Examined in the Microbiological Laboratory for the Five Years, 1915–1919, inclusive.

Month.	R. norvegicus.					R. rattus.					M. Musculus.				
	M.	F.	Total.	per cent.		M.	F.	Total.	per cent.		M.	F.	Total.	per cent.	
1915.															
January	160	136	296	54	46	316	286	602	52	48	3	6	9	33	67
February	183	160	343	53	47	311	207	518	60	40	26	11	37	70	30
March	182	155	337	54	46	317	270	587	53	47	19	6	25	76	24
April	172	122	294	58	42	249	182	431	57	43	2	2	4	50	50
May	187	168	355	52	48	271	261	532	51	49	17	13	30	56	44
June	141	131	272	51	49	185	180	365	51	49	7	5	12	58	42
July	153	128	281	54	46	240	220	460	52	48	2	1	3	66	34
August	159	142	301	52	48	268	198	466	57	43	...	1	1	...	100
September	132	153	285	46	54	186	188	374	49	51	2	...	2	100	...
October	142	126	268	52	48	342	297	639	53	47	...	...	...	...	...
November	153	137	290	52	48	312	232	544	57	43	...	1	1	...	100
December	135	135	270	50	50	233	195	428	54	46	4	7	11	36	64
Total	1,899	1,693	3,592	52	48	3,230	2,716	5,946	54	46	82	53	135	60	40
1916															
January	172	146	318	54	46	222	173	395	56	44	4	3	7	57	43
February	170	140	310	54	46	301	245	546	55	45	...	...	...	...	...
March	150	132	282	53	47	194	176	370	52	48	38	22	60	63	37
April	124	115	239	51	49	175	186	361	48	52	...	...	...	...	...
May	146	162	308	47	53	259	229	488	53	47	24	15	39	61	39
June	121	126	247	48	52	191	152	343	55	45	17	18	35	48	52
July	148	120	268	55	45	250	226	476	53	47	...	...	...	...	...
August	140	127	267	52	48	251	227	478	52	48	...	3	3	...	100
September	102	105	207	49	51	191	193	384	49	51	...	2	2	...	100
October	70	38	108	64	36	245	158	403	60	40	2	2	4	50	50
November	52	46	98	53	47	190	193	383	49	51	8	9	17	47	53
December	80	75	155	52	48	170	170	340	50	50	...	...	...	...	...
Total	1,475	1,332	2,807	52	48	2,639	2,328	4,967	53	47	93	74	167	55	45
1917.															
January	81	99	180	45	55	149	176	325	45	55	2	1	3	66	34
February	103	89	192	53	47	178	174	352	51	49	5	3	8	62	38
March	119	95	214	55	45	238	219	457	52	48	...	...	...	...	...
April	132	114	246	53	47	233	219	452	51	49	...	1	1	...	100
May	161	138	299	53	47	247	286	533	46	54	23	24	47	48	52
June	97	91	188	51	49	261	212	473	55	45	8	6	14	57	43
July	140	140	280	50	50	214	224	438	49	51	2	1	3	67	33
August	139	122	261	53	47	303	273	576	52	48	...	...	...	...	...
September	201	139	340	59	41	180	125	305	59	41	...	...	...	...	...
October	153	188	341	44	56	221	222	443	50	50	3	1	4	75	25
November	157	124	281	55	45	232	192	424	54	46	7	8	15	46	54
December	124	80	204	60	40	171	161	332	51	49	...	...	...	...	...
Total	1,607	1,419	3,026	53	47	2,627	2,483	5,110	51	49	50	45	95	52	48
1918.															
January	94	77	171	54	46	200	204	404	49	51	5	2	7	71	29
February	124	113	237	52	48	240	244	484	49	51	...	...	...	...	...
March	111	100	211	52	48	264	250	514	51	49	...	1	1	...	100
April	151	136	287	52	48	247	225	472	52	48	1	...	1	100	...
May	116	94	210	55	45	253	241	494	51	49	2	...	2	100	...
June	102	83	185	55	45	192	167	359	53	47	2	...	2	100	...
July	108	98	206	52	48	257	235	492	52	48	...	...	...	...	...
August	85	95	180	47	53	271	251	522	51	49	4	4	8	50	50
September	111	113	224	49	51	255	190	445	57	43	13	17	30	43	57
October	117	110	227	51	49	152	189	341	44	56	11	7	18	62	38
November	105	84	189	55	45	119	136	255	46	54	...	...	...	...	...
December	82	192	274	29	71	129	198	327	40	60	...	...	...	...	...
Total	1,306	1,295	2,601	50	50	2,579	2,530	5,109	51	49	38	31	69	55	45
1919.															
January	51	94	145	35	65	166	189	355	46	54	...	...	...	...	...
February	41	39	80	51	49	40	45	85	47	53	...	...	...	...	...
March	17	14	31	54	46	67	74	141	47	53	...	...	...	...	...
April	6	4	10	60	40	11	7	18	61	39	...	...	...	...	...
May	47	42	89	52	48	116	112	228	51	49	4	2	6	66	34
June	50	42	92	54	46	102	90	192	53	47	...	...	...	...	...
July	36	44	80	45	55	98	109	207	47	53	1	...	1	100	...
August	58	56	114	51	49	109	117	226	48	52	...	...	...	...	...
September	36	38	74	49	51	121	121	242	50	50	...	...	...	...	...
October	26	12	38	68	32	91	94	185	49	51	...	...	...	...	...
November	22	20	42	52	48	81	80	161	50	50	1	4	5	20	80
December	31	23	54	57	43	139	124	263	52	48	1	...	1	100	...
Total	421	428	849	46	54	1,141	1,162	2,303	49	51	7	6	13	53	47
Total for five years	6,708	6,167	12,875	52	48	12,216	11,219	24,435	52	48	270	209	479	56	44

MAP SHOWING COUNTRY INFANT WELFARE SERVICES IN VICTORIA — 1948-9



2. ANTHRAX IN SHAVING-BRUSHES—FIFTH REPORT.

Three cases of anthrax occurred during the year 1925, in which the infection was apparently acquired through the medium of infected shaving-brushes. In two of the cases (No. 32, Broken Hill, and No. 33, Greta) the brushes belonged to a known infected type which had been responsible for four previous cases (No. 7, Bankstown; No. 24, Albury; and Nos. 26 and 27, Wollongong). The origin of this brush has never been traced; in every instance the brush appears to be portion of old stock held in small retail shops for some years, the localities cited show how widely this type of brush must have been distributed in the country. In the third case (No. 34) the brush was not proved infected, and unfortunately the specimen was broken in the extraction of the base of the brush and no note was made of the type.

Case 32 (Broken Hill case).—The patient, a male, name and age unknown, cut a pimple on face while shaving on 4th March, 1925. The next day he did not feel well and face began to swell. He was admitted to Broken Hill district hospital on 7th March, 1925, with a lesion on face very suspicious of anthrax. Smears were made from the lesion on two occasions and a few large, square-ended bacilli were seen. The local process continued to spread and the temperature ranged from 100–102. Anti-anthrax serum (Commonwealth) was injected intravenously and subcutaneously over three days (210 c.c. in all). The patient reacted well and the process ceased to spread, the enlarged glands rapidly resolved, the temperature fell, and he felt much better in forty-eight hours after the first injection. Foments were applied, but no other treatment used. By 19th March, 1925, the temperature had been normal for some days and the patient feeling well; there was a central slough which had not come away, but the surrounding swelling had disappeared.

The brush used by patient was stated to have been purchased a few days before admission to hospital. The brush and a sub-culture made from the brush at Broken Hill were forwarded to this laboratory. The sub-culture was so overgrown that, though a few bacilli resembling anthrax were detected in smears an emulsion failed to kill a guinea-pig.

The brush proved to be a bone-handled imitation badger hair brush of the type found to be responsible for infection in cases 7, 24, 26, and 27. Washings from this brush killed a guinea-pig in four days, death being due to anthrax.

Case 33.—A. R., male, aged 19, top-hand employee at a coal-mine, Greta, was treated by a local practitioner for malignant pustule in October, 1925. It appears from the history that the patient purchased a shaving-brush at a store at Greta on 30th September, 1925. The brush was first used on the evening of 2nd October, 1925, having previously been washed in hydrogen peroxide and boiling water. Twenty-four hours later a swelling of the right side of the jaw was noticed, but no pain was felt. Next day the swelling had increased and was painful, while a small " boil " had appeared on the right cheek about the angle of the jaw. The patient was very prostrated and remained in bed during that day and the following two days.

A local practitioner was called in on 6th October, 1925. He suspected anthrax and sent the patient to a pathologist in Newcastle, where scrapings were examined, but no anthrax bacilli were detected. The patient improved rapidly; no serum was used and the pustule was not excised, the treatment being hot fomentations and poultices, and the slough separated about fourteen days later.

The storekeeper was visited and it was ascertained that the store had been taken over some eighteen months previously with all stock, and there was no record to show whence the brushes were obtained. A further brush was obtained of smaller size, but otherwise similar to the one used by A. R.; this was forwarded to the Microbiological Laboratory. The original brush used by the patient was forwarded to this laboratory by the practitioner who treated the case. It proved to be of the same type as had been responsible for the infection of Cases 7, 24, 26, 27, and 32. Inoculation of a guinea-pig with the washings from the bristles failed to convey anthrax, but washings from the base of the brush killed a guinea-pig in three days with anthrax.

The brush seized at the shop failed to infect a guinea-pig, but only the washings from the bristles were tested.

Case 34.—A. G., male, age unknown, telephone mechanic, was admitted to Bega hospital from Moruya in November, 1925, as a suspicious case of anthrax. The patient is known to have purchased a shaving-brush from a Chinese store at Moruya about two weeks previously. This brush was the last in stock.

A shaving-brush was found in the patient's room at the boarding-house where he resided and forwarded to this laboratory. The brush was not of a known infected type, but was destroyed during the tests and no photograph kept; the results of injections into guinea-pigs of washings from the bristles and base of the brush proved negative.

It is possible that this brush is not the one responsible for the patient's infection, since he is stated to have possessed two brushes and the other was not procured for testing.

The following clinical details of the case have kindly been supplied by Dr. M. O'Reilly :—" A. G. sent into Bega hospital by Dr. H. Lister, Cobargo, suffering from an inflamed indurated swelling over right jaw. The nature of this was not at first recognised, and it was incised with no discharge of pus. After a few days it became darker and necrotic in the centre and soon assumed the typical appearance of an anthrax pustule. Bacilli resembling the *B. anthracis* were seen in smears. No cultural investigations were made. A few weeks previously patient had purchased a new shaving-brush at a general store at Moruya and had shaved himself on two or three occasions since, using the new brush. The patient made a good recovery without further local measures. The whole base of the pustule sloughed away, leaving a cavity about ½ inch deep and 1 inch in diameter. I cannot remember for certain whether he had any serum, but am inclined to think not. He was a linesman employed by the Postal Department and his headquarters were then at Moruya. He had been working on a line that ran through a farm where a few sheep were kept, but had not come into contact with them in any way."

CASES IN OTHER STATES.

A table has been given showing the cases which have occurred in New South Wales; this table has been published in part previously, but is now brought up to date.

A similar table was published in " Health," Vol. I, 1923, p. 75, including all Australian cases up to that date. It has been thought advantageous to briefly review all cases where infection was conveyed by shaving-brushes which have occurred in other States; this has been done under the heading of each State. The object of this revision is to show identity of brushes with types found in New South Wales. For reference purposes it has been thought advisable to publish the photographs of the type collection of infected shaving-brushes made by this Department.

Western Australia, 1917, three cases—One case in Perth, March, 1917; source not traced, but shaving-brush suspected. Fatal case in July, 1917; source a shaving-brush of Japanese origin. A case at Kalgoorlie in September, 1917, traced to a brush of same type from same consignment as July case.

Victoria, 1917.—One case in a wharf-labourer in Melbourne. Lesion on chin suggesting infection from shaving-brush, but brush not traced.

1920.—Wodonga case traced to shaving-brush purchased at Albury. This case has been included in the New South Wales series (No. 6) as the brush was purchased in this State.

1921.—Two cases occurred in Victoria from Japanese brushes purchased in Melbourne. Both brushes proved infected with anthrax. In one case the brush was labelled No. 841, presumably a trade number and was stated to have been purchased from a wholesale firm in Sydney. No further brushes of this number could be traced on inquiry at this firm. Recently a specimen of 841 has been received from Melbourne and the brush proves to be identical with type IV, which was responsible for infection in cases 7, 24, 26, 27, 32, and 33 of the New South Wales series.

1922.—A case occurred in Victoria in August, 1922, where infection was due to a brush purchased in Brisbane. This brush proved to belong to a known infected brand, and was identical with Type X of the Laboratory collection. Reference has been made to this type of brush in the Annual Report of the Director-General of Health, New South Wales, for 1922, p. 128, where the type is described under the trade number B. 1008.

1924.—One case recorded from Victoria; infected brush proved to be of same type as that responsible for cases No. 5 and 17 (Type III).

1925.—One case in January, 1925, recorded in " Health Bulletin," Department of Public Health, Victoria, No. 1, January–March, 1925, p. 19. The brush proved to be the same as that found infected in Case No. 28 of the New South Wales series.

1926.—Two cases in Victoria. (*a*) *January,* 1926.—Fitzroy case. Brush apparently the same as implicated in Case No. 10 (Type II), but with yellow varnish in place of black. It is probable that the brush in Case 2 (destroyed) was of this type. It might be noted in connection with Case 2 that while the patient's brush was varnished brownish-yellow, two others of same type and found infected were varnished black. (*b*) *May,* 1926.—A photograph of the brush responsible in this case has been forwarded to us (Type XVIII). It is a wooden-handled brush with metal top and distinct from any examined in this Laboratory.

South Australia, 1923.—A fatal case of anthrax following on a cut received while being shaved is recorded by Professor J. B. Cleland in the " Medical Journal of Australia," Vol. II, 1923, p. 455. The patient was shaved at a barber's shop; a brush examined was not proved infected, but there is no certainty that this brush was the one used when the patient was shaved.

1925.—A case of anthrax in a fireman from a ship was admitted to the Adelaide hospital on 4th February, 1925. A shaving-brush found in his kit was of cheap make with brown bristles and a celluloid handle in black and white. The bottom of the brush bore a shield and the words " Trade Mark." No anthrax bacilli were detected in the brush. The patient gave misleading and contradictory statements regarding his shaving-brushes, of which he stated he possessed two, but only the one was found and the source could not be traced. I am indebted to Dr. Hone and to the Adelaide hospital authorities for particulars of this case.

Queensland, 1921.—A fatal case of facial anthrax admitted to Brisbane hospital on 4th June, 1921 reported by Dr. Hedley Brown in the " Medical Journal of Australia," Vol. II, 1921, pp. 484–5. The patient's shaving-brush was found to be infected with anthrax, but no details are available as to the make of the brush.

TABLE I—*Anthrax Bacilli* demonstrated.

Case.	Location of cases.	Lesion.	Patient's brush.	Other brushes of same type.	Remarks.
1	Coast Hospital (Sydney)	+	+	+	Brown wooden handle brush, No. 60,216. Type I.
2	Glen Innes	Not investigated	+	+	Two other brushes of same shape, but different colour, proved infected. Probably identical with Type II.
3	Coast Hospital (Sydney)	+	—	—	American brush, white handle, black vulcanite top. Type A.
4	Orange	+ Sections only	—	....	Type unknown.
5	Sydney Hospital	+	—	+	Type III.
6 (Fatal)	Wodonga (Albury)	Not investigated	+	+	Original brush investigated in Melbourne. One infected brush found at Albury, doubtfully of same type as patient's brush. Infected brush same type as in Case 5. Type III or B.
7	Granville Hospital (Bankstown)...	Sections only. No bacteriological examination.	—	+	Brush purchased at Bankstown. Type IV.

TABLE I.—*Anthrax Bacilli* demonstrated—*continued.*

Case.	Location of cases.	Lesion.	Patient's brush.	Other brushes of same type.	Remarks.
8	Junee	+	+	—	Type V.
9	Carcoar (Sydney)	+	+	+	Brush purchased in Sydney. Type VI.
10 (Fatal)	Liverpool	+	+	....	Brush of similar type to infected brush, Case 2, Type II.
11	Coast Hospital (Queanbeyan)	+	+	....	Brush same type as in Case 9. Type VI.
12 (Fatal)	St. Peters (Condobolin)	+	—	....	Brush of same type as in Case 1 (60,216). Type I.
13	Sydney Hospital (Sydney)	+	A. + B. —	— +	A. Purchased, but not used. Type VIII. B. Used. Type VII.
14 (Fatal)	Ashfield	+	—	....	Brush, six months in use. C.
15	St. Vincent's Hospital	....	—	—	Shaved at barber's. Cut down paint brushes. D.
16	Parramatta	....	—	—	American type of brush. F.
17	Coast Hospital (North Sydney)	+	—	+	Shaved at barber's. Brush of same type as Case 5, but rebound. Type III.
18	Coast Hospital	+	+	+	B. 1008. Type X.
19	South Sydney Hospital	+	—	—	Shaved at barber's. Brushes submitted (2) in long use, American type.
20	Coast Hospital	+	—	+	B. 1008. Type X.
21 (Fatal)	Camden	Not examined	—	....	G.
22 (Fatal)	Ganmain	Not examined	+	+	Type XIV.
23	Mosman	+	—	—	Shaved at barber's. Brushes submitted of local manufacture. Chinese bristles. D.
24	Albury	—	+	+	Type IV.
25	Emmaville	—	+	+	Black-handled brush. Type XIII.
26	Wollongong	Specimen examined by doctor. +	+	+	Type IV:
27	Wollongong	Specimen examined by doctor. +	+	+	Type IV.
28	Manly	+	+	+	Bone-handled. Smaller type of brush than usual. Type XV.
29	Greta	....	+	+	White wooden-handled brush. Type XVI.
30	Newcastle	+	+	+	Same type as Case 29. Type XVI.
31	Rockdale	+	+	None obtained	Metal-handled brush. Type XVII.
32	Broken Hill	+	+	+	Type IV.
33	Greta	—	+	+	Type IV.
34	Bega	+	—	None examined	Unknown.

ANTHRAX INFECTED BRUSHES.

Types proved infected by animal inoculation.

TYPE I.
Cases 1 and 12.

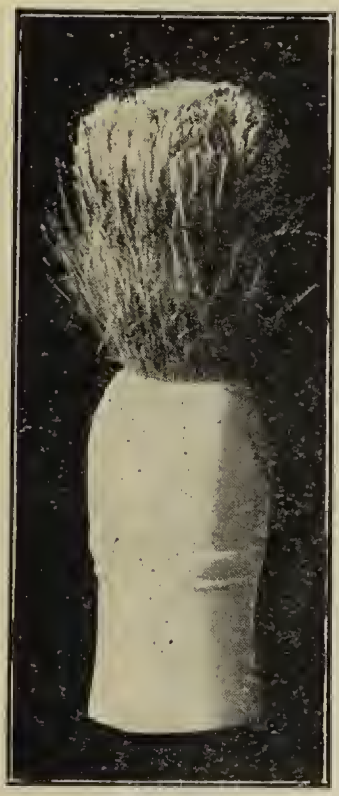
TYPE II.
Case 10.

TYPE III.
Cases 5 and 17.

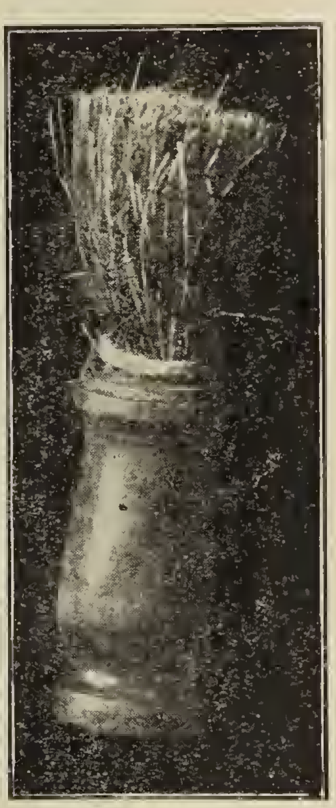
TYPE IV.
Cases 7, 24, 26, 27, 32, 33.

TYPE V.
Case 8.

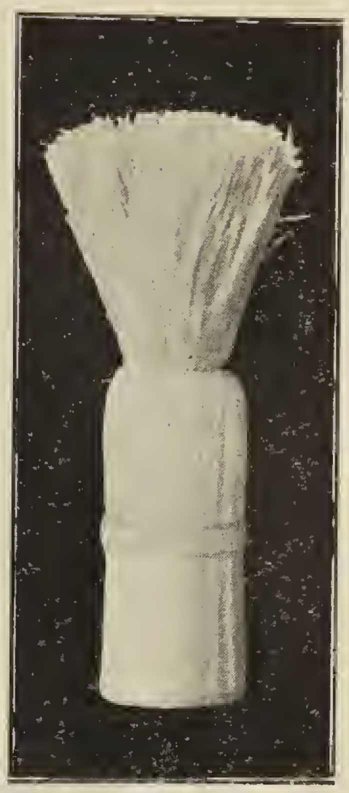
TYPE VI.
Cases 9 and 11.



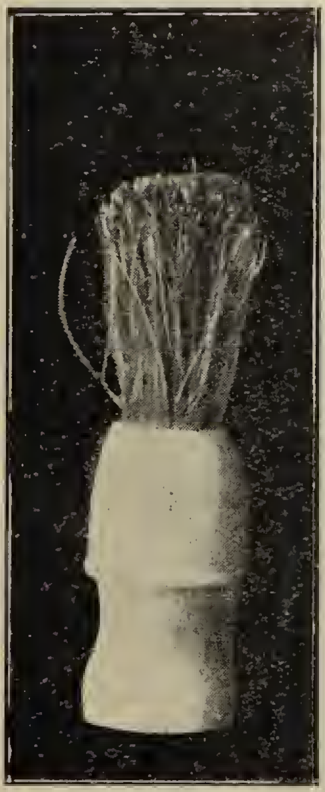
TYPE VII.
Case 13.



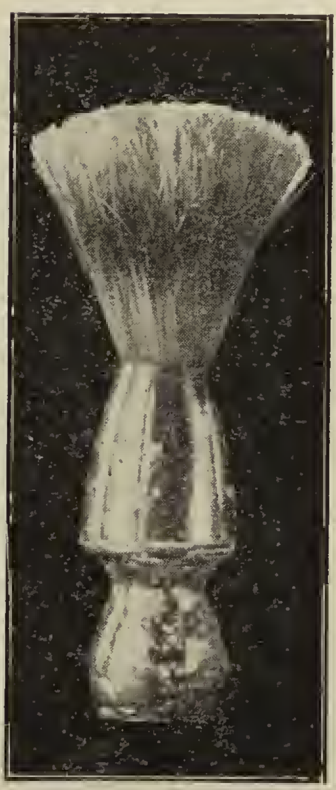
TYPE VIII.
Purchased but not used
in case 13.



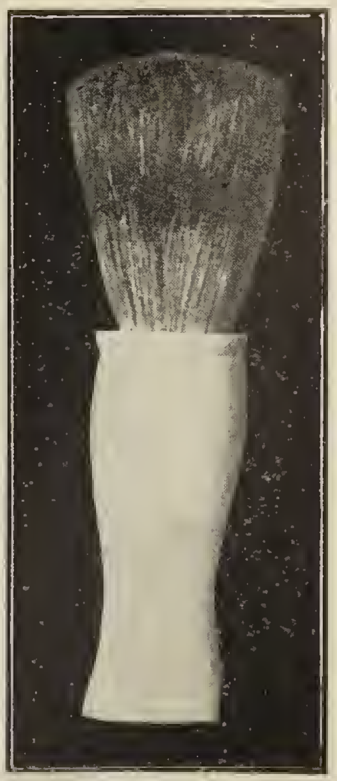
TYPE IX.
Purchased—no case associated.



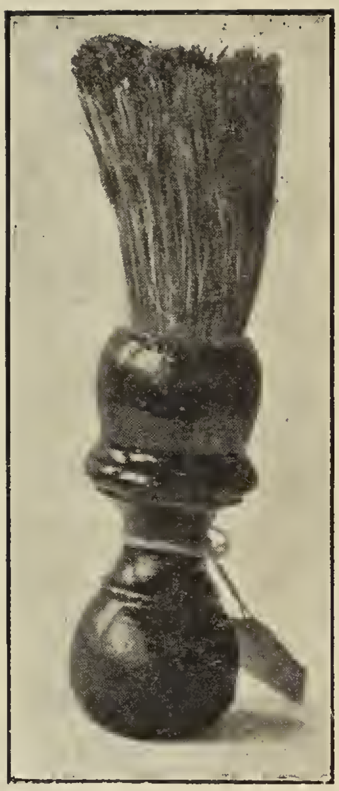
TYPE X.
Cases 18 and 20.
Melbourne Case.



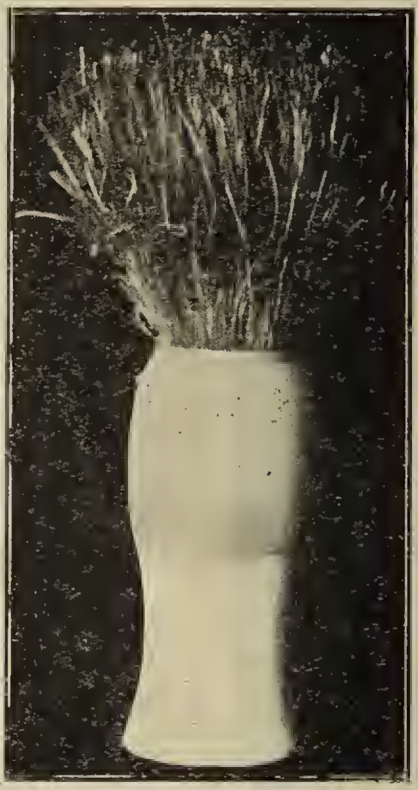
TYPE XI.
Purchased—no case
associated.



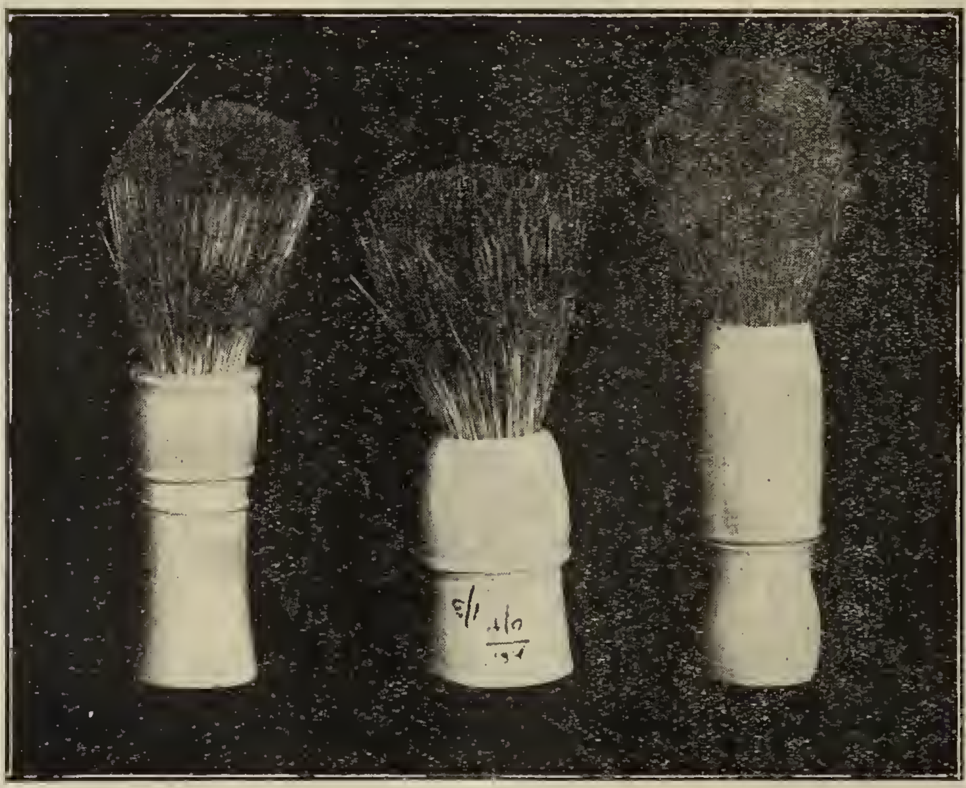
TYPE XII.
No case associated.



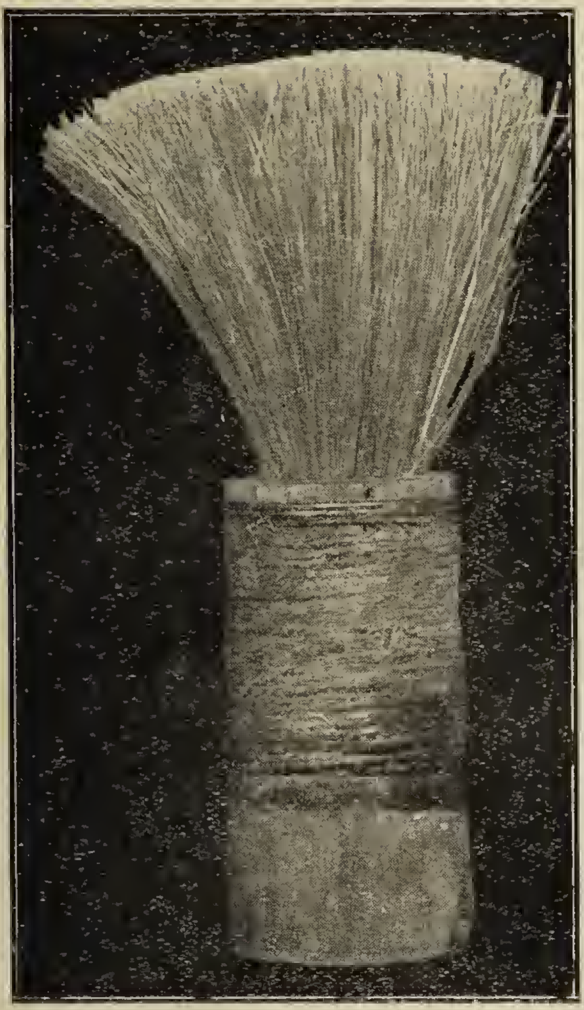
TYPE XIII.
Case 25.



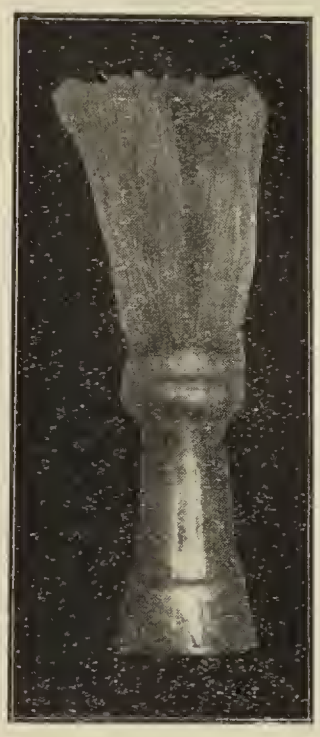
TYPE XIV.
Case 22.



TYPE XV.
Case 28—Infected brush in middle.



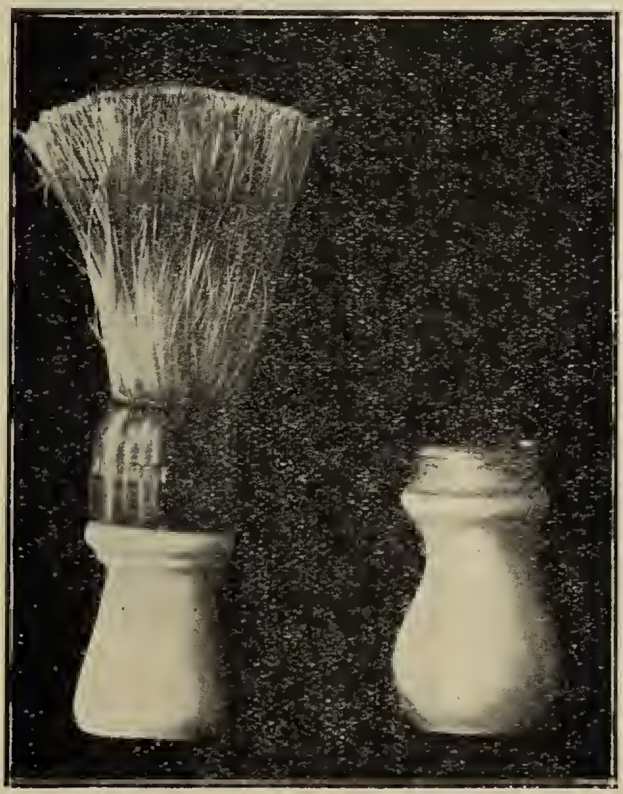
TYPE XVI.
Cases 29, and 30.



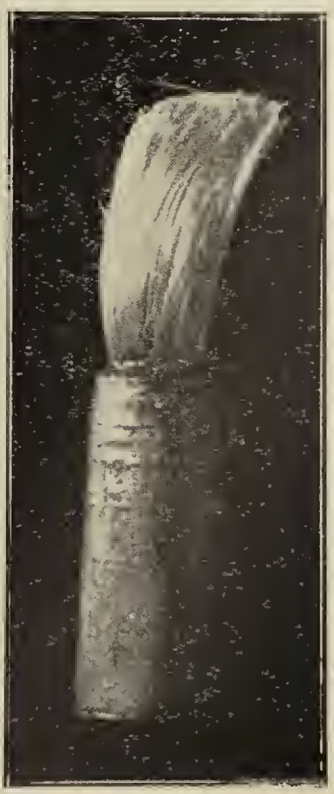
TYPE XVII.
Case 31.

SUSPECTED BRUSHES.

Associated with cases of facial Anthrax, but not proved infected.



A.
Associated with Case 3.



B.
Possibly associated with
Case 6.

C.
Associated with Case 14.

D.
In use at barbers—
Case 15 and 23.

E.
Associated with a case
regarded as of
Streptococcal origin.

F.
Associated with Case 16.

G.
Associated with Case 21.

3.—THE SCHICK TEST IN NEW SOUTH WALES—THIRD REPORT.

(E. W. FERGUSON.)

The systematic testing of children for susceptibility to diphtheria by means of the Schick test was commenced by this department in 1923, and has been carried on during the years subsequent to that date. Reports on the results obtained have been reviewed in the Annual Reports of the Director-General of Public Health for 1923 and 1924; the present report deals with the campaign carried out during 1925. An outline of the technique of the test and of the general procedure incidental to a campaign has been given in the report for 1923, which should be consulted.

During 1925, campaigns were carried out at Cowra, Corowa, Coonamble, Gulargambone, Quambone, Narrabri and Sodwalls, while the test was also done on the inmates of a Children's Home at Glebe Point in which cases of diphtheria had occurred. It is proposed to review the results obtained at each place separately.

Narrabri (population 2,340).—The tests carried out at Narrabri were in continuation of those done during 1924 (Annual Report, 1924, p. 168). The children tested comprised 25 children who had been previously positive and had received injections of toxin-antitoxin, and 97 children who had not previously been tested.

The 25 children retested included one (M.F.) who had previously given a negative result, but who had received the immunising injections. This child was subsequently admitted to the Coast Hospital, Sydney, as a case of diphtheria, the Klebs Loeffleur bacilli being grown from her throat. On retesting, the child gave a definitely negative result. In view of the two negative tests and of the fact that she had received the toxin-antitoxin injections, I am of opinion that the disease for which she was admitted to hospital was not diphtheria, but an ordinary sore throat, and that she was at the same time carrying the diphtheria germs in her throat.

The remaining 24 showed negative results in 19 cases, slight positive reactions in 3, while no readings were obtained in 2.

The 97 children tested for the first time showed 18 positive results (4 of which were noted as slight), and 78 negative, while one child was absent and no result could be obtained. Excluding the absentee and including the slight positive reactions amongst the positives, the results show 18 positive out of 96, or 18·7 per cent. This figure is in close keeping with the figure (18·73 per cent.) obtained during the previous testing at Narrabri. The children tested were distributed as follows :—State school, 82 tested, 13 positive; Convent school, 15 tested, 5 positive.

The age groups of the children with the positive results and their percentages are shown below :—

	Age group.	Boys.			Girls.			Total.		
		No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.
Narrabri Schools	1– 5.........	4	1	25	4	...	......	8	1	12·5
	6–10.........	20	4	20·	35	9	25·7	55	13	23·6
	11–15.........	13	...	......	20	4	20	33	4	12·1
	All ages ...	37	5	13·5	59	13	22·0	96	18	18·7

Cowra (population 5,000) lies on the Central Tablelands to the west of the Main Dividing Range, on the headwaters of the Lachlan River.

Two series of tests were carried out at Cowra and in the Waugoola Shire. In the first series, which was carried out in July, 141 children were tested; these included 122 children at the Intermediate High School and 19 children at the Convent School. Of this number no less than 27 (High School, 20; Convent School, 7) were absent from all readings; this was owing to the inclement weather at the time the readings were taken. The results were as follows :—

	Positive.	Negative.
Intermediate High School	36	66
Convent School	2	10

In the second series in December, school children were tested not only in Cowra, but in the surrounding (Waugoola) shire. The results are shown in the accompanying table :—

Schools	No. tested.	Positive.	Negative.	Absent.		No. tested.	Positive.	Negative.	Absent.
Battery State School	9	6	3	...	Koorawatha State School	11	8	3	...
Billimari State School	17	12	5	...	Koorawatha Convent School ...	2	2	...	...
Broula State School	6	1	5	...	Maribilli State School	1	1	...	...
Chiverton State School	16	8	6	2	Marongla State School	21	12	9	...
Cowra State School	75	23	51	1	Warwick State School	8	2	6	...
Cowra Convent School	22	5	16	1	Wattamondara State School ...	22	12	10	...
Cumgillica State School	3	2	1	...	Woodstock State School	40	16	24	...
Darby's Falls State School	21	7	14	...	Woodstock Convent School......	3	...	3	...
Erambie State School	18	2	16	...	Wynnefield State School	14	10	4	...
Gooloogong State School	8	...	8	...					
Holmwood State School	16	6	9	1	Total	333	135	193	5

The total number tested in the two series was thus 474, or excluding the 32 children who were absent from the readings, 442; of this number 173, or 39 per cent., were positive.

The age and sex grouping of the results are shown in the following table, the Cowra schools and schools in smaller centres being grouped separately. The influence of the larger town population of Cowra is shown in the lower percentage of positive results, 31·57 per cent. positive as against 45·92 per cent. in the country schools of Waugoola Shire.

Schools.	Age group.	Boys.			Girls.			Total.		
		No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.
Schools in Cowra Municipality.	1—5.........	1	...	......	1	1	100	2	1	50
	6–10.........	59	20	33·89	61	24	39·34	120	44	36·66
	11–15.........	52	10	19·23	35	11	31·42	87	21	24 13
	All ages ...	112	30	26·78	97	36	37·11	209	66	31·57
Schools in Waugoola Shire.	1– 5.........	2	2	100	3	2	66·66	6	5	83·33
	6–10.........	57	28	49·12	52	28	53·84	126	67	53.17
	11–15.........	30	15	50	47	17	36·17	81	32	39·50
	Adults	...	...	......	2	1	50	2	1	50
	Age not given	9	...	......	9	2	22·22	18	2	11·11
	All ages ...	98	45	49·12	113	50	44·24	*233	*107	45·92

* Included in the total are 22 (12 of which are positive) in which the sex of the children was not given.

Corowa (population 4,000) is a town of Riverina, situated on the Murray River; the surrounding country is largely a vineyard country Tests were carried out at Corowa in September, children attending at the State School, the Convent School, and the South Corowa State School being tested. The results are shown below:—

School.	No. tested.	Positive.	Negative.	Absent.	School.	No. tested.	Positive.	Negative.	Absent.
Corowa State School...............	115	41	71	3	Other children	7	5	2	...
Corowa Convent School	72	24	43	5					
South Corowa State School ...	19	4	15	...	Total	213	74	131	8

Excluding absentees the tests showed a positive result of 36·09 per cent. The age and sex grouping are shown below:—

Schools.	Age group.	Boys.			Girls.			Total.		
		No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.
Corowa District	1– 5.........	12	8	66·66	3	1	33·33	15	9	60
	6–10.........	45	9	20	69	33	47·82	114	42	36·84
	11–15.........	33	5	15·15	40	15	37·5	73	20	27·39
	Adults	1	1	100	1	1	100	2	2	100
	All ages ...	91	23	25·27	*114	*51	44·73	*205	*74	36·09

* Included in the total is one female whose age was not given.

Coonamble and Wingadee Shire.—Coonamble (population 3,100) is situated on the Western Plains on the bank of the Castlereagh River The whole district is pastoral (sheep). At the time that the tests were carried out at Coonamble similar tests were made at Gulargambone, 28 miles to the south on the Castlereagh River, and Quambone, 36 miles to the west, both places of approximately the same size in Wingadee Shire. The results are tabulated below:—

School.	No. tested.	Positive.	Negative.	Absent.	School.	No. tested.	Positive.	Negative.	Absent.
Coonamble State School	46	11	34	1	Gulargambone State School ...	80	39	40	1
Coonamble Convent School ...	33	5	26	2	Quambone State School.........	32	11	21	...
Highgate College, Coonamble ...	7	4	3	...					

Excluding absentees the tests showed the following percentage of positive results:—

Coonamble Schools	24·0 per cent.
Wingadee Shire Schools	45·0 ,,

The age and sex grouping is shown below :—

Schools.	Age group.	Boys.			Girls.			Total.		
		No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.
Coonamble	1– 5.........	3	1	33·33	2	1	50	5	2	40
	6–10.........	22	5	22·72	21	7	33·33	43	12	27·9
	11–15.........	20	2	10	14	3	21·42	34	5	14·70
	Adults	1	1	100	...	...	......	1	1	100
	All ages ...	46	9	19·56	37	11	29·73	83	20	24
Wingadee Shire	1– 5.........	5	2	40	7	4	57·14	12	6	50
	6–10.........	28	11	39·29	28	14	50	56	25	44·64
	11–15.........	24	10	41·66	19	9	47·36	43	19	44·18
	All ages ...	57	23	40·35	54	27	50	111	50	45·04

Anarel School (Sodwalls).—These tests were undertaken as the result of a small outbreak of diphtheria in the Sodwalls district, a somewhat isolated locality on the Main Dividing Range, about 20 miles west of Lithgow; 18 children were tested, of which 11, or 61 per cent., proved positive. The age and sex distribution of the positive results are given below, though the figures are too small to be reliable :—

School.	Age group.	Boys.			Girls.			Total.		
		No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.	No. tested.	No. positive.	Per cent. positive.
Anarel School, Sodwalls	1– 5.........	1	1	100	1	...	......	2	1	50
	6–10.........	2	2	100	5	4	80	7	6	85·71
	11–15.........	5	2	40	3	2	66·66	8	4	50
	Adults	1	...	......	...	...	......	1	...	......
	All ages ...	9	5	55·55	9	6	66·66	18	11	61·11

Roylestone Home (Glebe Point).—Owing to an outbreak of diphtheria in the Home, all the inmates who had not been removed to the hospital were tested. All the children (31) were boys, and one (aged 12) showed a positive result. The result is not surprising, as probably the majority of the susceptible children had acquired the disease and had been removed to hospital.

4. FOOD POISONING OUTBREAKS IN NEW SOUTH WALES.

Cases of food poisoning of one form or another are met with each year usually during the summer and autumn months. The number of such cases during recent years appears to be on the increase. It is probable the less severe outbreaks of this form of illness sometimes escape entirely the notice of this Department. Not unusually the first information is derived from press reports, and though these probably represent isolated instances of food poisoning, they are of special interest and importance, seeing that a considerable number of persons is sometimes involved; the type of illness is more severe necessitating recourse to hospitals for treatment by a number of the sufferers. The compulsory notification of cases of food poisoning has been urged by sanitary authorities in some parts of the world, but though this procedure has not been adopted, except in isolated instances, the importance of the subject warrants closer attention than is often given to it.

Cases of food poisoning are met with both in the towns and in country places. The rapid increase in population in the cities, with its accompanying overcrowding of houses, many of which do not possess proper means for the safe storage of perishable foodstuffs, tends to favour their contamination with consequent risk to the consumers. Life in large cities has another effect in tending to increase the extent to which people resort to canned foods and meats sold in cooked condition. The increased use of this form of food emphasises the necessity for greater attention being paid by sanitary authorities to premises used for this class of business. The question of ensuring the proper sanitary condition of premises used for the manufacture, preparation, storage or sale of foods for human consumption is of very great importance, and, in order to improve matters, it has been urged by some local authorities that all such premises should be subject to license. The Local Government Act empowers councils to control and regulate premises of this description, but so far no ordinances have been framed under that Act to deal with them. The regulations under the Pure Food Act are very wide in scope and contain powers which, if efficiently carried out, will go a long way towards ensuring a wholesome food supply. Medical examination of persons handling foodstuffs is a matter of routine in several of the American States.

Food poisoning is in most cases due to infection with bacteria, excluding cases where food may contain metallic or other poisons. Such bacteria include the bacteria of dysentery, typhoid, botulism, and the food poisoning bacilli. The series of outbreaks to be considered comprise those due to infection with bacilli of the food poisoning or Salmonella group. Food poisoning due to bacilli of this group is commonly termed" Ptomaine poisoning." The term is, however, quite an erroneous one and should be discarded. Food is not allowed to decompose before consumption to the extent that ptomaines are formed. The only exceptions are game and venison, and these are not especially prone to cause food poisoning. On the other hand, food poisoning may be conveyed by food which to all appearances is fresh and undecomposed.

The modes of infection of food, most commonly meat, are summarised in the U.S.A. Naval Bulletin, Vol. 21, 1924, p. 893 :—

1. Meat infected during life of animal.
2. Meat contaminated by intestinal contents in cutting up the carcase after slaughter. Contents of intestine of healthy animals not infrequently contain bacilli of the meat poisoning group.
3. Contamination by rats and mice or by flies and cockroaches which have had access to fæces of rodents.
4. Contamination by the hands of a human carrier or of diseased persons. Such contamination may occur at any point from the slaughter-house to the kitchen. It is most likely to occur while the meat is being prepared or after it has been cooked.

After contamination rapid growth of the bacilli may take place in a warm room in ten to twelve hours, hence the increased number of cases in warm weather.

The food-poisoning group contains a number of closely allied organisms; the exact number and relationship of the various members does not appear to be fully known. Savage and White, in a recent report on a study of 100 outbreaks published by the Medical Research Committee (Special Report Series No. 92), tabulate the members of the Salmonella group as follows :—

Type.	Disease Producing Role.	
	Man.	Animals.
B. paratyphosus A. ...	Paratyphoid fever	Not found.
B. enteritis	Gastro-enteritis of food-poisoning type. Occasionally sporadic causes of illness.	Disease of cows and calves. Disease of rats. Probably also in other animals.
Derby	Human food poisoning	Pigs : exact disease-producing role unknown.
B. paratyphosus B. ...	Paratyphoid fever. Probably never food poisoning.	Not found.
B. ærtrycke	Food poisoning. Sporadic cases of illness (possibly).	A wide-spread cause of enteritis in mice, guinea-pigs and other rodents. Enteritis in parrots and other birds. Occasionally found in pigs. Occasionally a cause of calf enteritis. Does not occur commonly in rats.
Stanley	Food poisoning	Not yet isolated from animals.
Newport	Food poisoning. Possibly sporadic cases of illness.	Dog suffering from enteritis, otherwise unknown in animals.
Reading	Inadequate knowledge	Not so far isolated.
B. abortus equi	Not found	Abortion of horses.
B. suipestifer	Paratyphoid fever (C type). Food poisoning (very exceptionally).	Secondary invader in pigs in Hog Cholera. Occasionally as a primary cause of disease in pigs.

Fuller details of the relationship of the different strains are given by these authors in a report on " An Investigation of the Salmonella Group," published by the Medical Research Committee (Special Report Series No. 91, 1925). While this list comprises all the members of the group isolated in cases of food poisoning in Great Britain, it is possible that in other regions other members of the Salmonella group may have been responsible for outbreaks of food poisoning. A list of the commoner members of the Salmonella group given in Park and William's " Pathogenic Micro-organisms," 8th edition, 1925, includes several species not included in Savage and White's list. It is not claimed, however, that these are pathogenic for human beings. It is possible that some of these may be identical with some on the list given by Savage and White.

Savage and White (Report Series No. 92) group outbreaks of food poisoning as follows :—

Group I.—Cases associated with infection of the food with members of the Salmonella (or Gaertner) group of bacilli.

(*a*) Outbreaks due to living Salmonella bacilli.

(*b*) Outbreaks due to the presence of undestroyed Salmonella group toxins.

Group II.—Outbreaks associated with organisms of dysentery type.

Group III.—Botulism group.

Group IV.—Outbreaks associated with cheese.

Group V.—Outbreaks of definite chemical origin.

Group VI.—Outbreaks of undetermined origin.

In their report on 100 outbreaks of food poisonoing these authors found out that 70 per cent. of these outbreaks were due to Salmonella bacilli.

In the present series of outbreaks there is no evidence that any of the cases were ascribable to Groups II, III, IV or V. Most would fall under Group VI, but probably all should be included in Group I.

In investigating any outbreak of food poisoning, two main lines of investiagtion must be followed—(*a*) epidemiological, and (*b*) bacteriological, including serological.

(*a*) *Epidemiological Investigation.*—This includes inquiry into the full history of the outbreak, with particular relation to the patients affected, the food consumed at the previous meal or meals, the relation of patient and others not affected to each particular article of diet, the previous history of the food, its source, preparation, storage and handling, the symptomology of the outbreak, the possible relation to carriers, &c. The epidemiology has been fairly thoroughly investigated in the cases under consideration. These inquiries may tend to incriminate some particular article of diet, but will not determine the type of organism responsible.

Bacteriological.—The object of the bacteriological investigation is to determine as far as possible the type of infection. For accurate identification extensive material may be necessary. This should include samples of the food consumed, specimens of the fæces of patients, post mortem specimens in the event of death, and sera from patients. Unfortunately, in many cases adequate material is not available.

Where the outbreak is due to infection of the patient with living bacilli, these may be recovered from the organs of a fatal case, from the fæces of patients, or from the incriminated food. The serum may also give agglutination reactions with one or other of the bacilli of the Salmonella group. Where the outbreak is due to endotoxins contained in the bodies of dead bacilli the furnishing of proof that these toxins are the cause of the outbreak may be a matter of great difficulty. Savage and White lay down three lines along which evidence may be sought.

(*a*) Demonstration of the toxicity of the food by feeding animals with it or by injecting extracts of the suspected food into animals. This method is unsatisfactory, inasmuch as laboratory animals are not highly susceptible to infection by organisms introduced by the mouth. The results are variable, and many animals are refractory. While this applies to live organisms, it is still more marked as regards cultures containing only dead bacilli. Introduced by subcutaneous or intraperitoneal injection, these toxins are more potent, but it is impossible to distinguish between the effects caused by the toxin and those by the introduction of foreign protein or protein products.

Savage and White state they have found it possible to demonstrate a toxin effect by feeding with large doses, killing the animal 9–12 hours afterwards, and examining the stomach and small intestine for evidence of inflammatory action.

(*b*) Demonstration of the production of specific agglutinins in the blood of patients suffering from food poisoning. While this method is of undoubted value in cases of infection by living bacilli there is no evidence that agglutinins are formed by dead bacilli that are boiled. "The type of disease set up by heated toxins is acute gastro-intestinal irritation with marked diarrhœa and vomiting, and with quick recovery after elimination of the irritant. Under such circumstances very little production of agglutinin is to be anticipated, and in practice it is rare to be able to demonstrate its development." (Savage and White, Report No. 92, p. 15).

(*c*) Demonstration of the production of specific agglutinins in animals through the injection into them of suitable emulsions of the incriminated food. This method was found to be of value by Savage and White ; it depends, of course, on the suspected food being available.

Outbreaks of food poisoning in New South Wales have been investigated on several occasions, and a report on two outbreaks was made to the Legislative Assembly in 1903, and printed under the heading "Ptomaine Poisoning (Reports Respecting)." One of the outbreaks followed the consumption of cold corned beef, and appeared to be due to toxins; bacteriological results were negative. The other outbreak is intensely interesting since the cases—51 persons in 12 households—were spread over a period of five weeks. In all cases direct connection was traced between the onset of symptoms and the consumption of brawn supplied by a retailer in Surry Hills. Dr. W. G. Armstrong, who investigated the outbreak, came to the conclusion that the source of the infection was on the moulds, which were made of old preserved meat tins, cuboid in shape, and presenting more or less rough edges. It is probable that only a small portion of brawn was affected at one time, and that successive batches were thus infected. Dr. Tidswell isolated *B. gaertner* from the brawn, but this name probably merely implies a member of the Salmonella group.

In the present series ten outbreaks have been investigated; four of them were probably true infections; the remaining six appear to have been caused by toxins contained in the bodies of dead bacilli. The bacteriological results may be summarised as being negative in the six cases ascribed to toxins, not carried out in three of the cases ascribed to infection, and positive in one case, the organism isolated being an unidentified member of the Salmonella group.

SUMMARY of Outbreaks detailed below :—

Outbreak.	Suspected Food.	Probable Nature of Infection.	Bacteriological Examination.
1. Balmain	Corn beef	? Toxic	Negative.
2. Cessnock	? Ham	Toxic	,,
3. Five Dock	Anchovette paste	,,	,,
4. Lane Cove	Sausage meat; mince meat	,,	,,
5. Fairy Lands	? Tongue	,,	,,
6. Waverley	? ,,	,,	,,
7. Hamilton	Beef	Bacterial	Not done.
8. National Park	? Ice cream	,,	,,
9. Narrabeen	? Cream	,,	,,
10. Glebe Point	Unknown	,,	Salmonella group.

1. BALMAIN OUTBREAK (DECEMBER, 1922).

A fatal case of food poisoning occurred at Balmain, in which suspicion fell on corned beef as the vehicle of infection ; two other members of the family were ill, but recovered.

History.—On 16th December a piece of silverside corned beef was purchased from a local butcher ; as it was too large it was halved with the woman in the adjoining house. The portion retained was cooked the following morning. The meat was eaten by Mrs. D., her mother, Mrs. P., and her little boy, for the Sunday (17th) dinner ; also at tea time ; the mid-day meal and evening meal, 7·30 p.m., on Monday (18th). All three were taken ill about 8·30 p.m. and Mrs. P. died during the night. The meat appeared quite sound and was kept in a safe ventilated by wire gauze on three sides. At the evening meal tomatoes were also eaten, and it was noticed that some of the tomatoes tasted bitter. The only other food eaten at this meal were stewed peaches. At 4 p.m. on the 18th, Mrs. D. and Mrs. P. had a couple of glasses of hop ale—a temperance drink.

The butcher who had sold the meat to Mrs. D. was visited and inquiries made as to complaints of illness from othe customers. He stated that no complaints had been made, but that he had heard that some people nearby had been taken seriously ill through eating corned beef. The pickling tanks were found to be well constructed.

Chemical Examination.—The stomach and its contents and parts of organs of the deceased Mrs. P. were submitted for chemical analysis, but no poisons were found.

Three other specimens, namely hop ale, tomatoes, and mustdie, were also examined with negative results.

Bacteriological Examination.—Portion of the corned beef partaken of by Mrs. P. was submitted by the police. The corned beef was not in a sterile container, but merely wrapped up in newspaper. Portion was shaken up in nutrient broth and plated ; 24,000 million colonies per gram of meat were present, mostly proteus bacilli. No organisms of known pathogenic type were found.

A guinea-pig was inoculated with 1 c.c. of a broth suspension of 5 grammes in 10 c.c. The animal died in two hours; post-mortem showed acute inflammation of the peritoneum. Cultures showed a mixed coliform proteus growth.

A second guinea-pig was fed with meat mixed with crushed corn. Very little was consumed, but the animal appeared slightly sick on the following day.

A watery extract of the meat was filtered through a porcelain filter and injected into two guinea-pigs. One guinea-pig received 1 c.c. intraperitoneally and within two hours appeared sick and as if likely to die ; it, however, gradually recovered, though obviously sick, the next day. The second guinea-pig received ·5 c.c. of the filtrate ; it did not develop symptoms till the following day ; it also gradually recovered.

Cultures from the stomach of Mrs. P. yielded a growth of a coliform bacillus (*B. oxytocus*) and a small micrococcus ; neither appeared likely to have been the casual organism.

An extract from the stomach was injected into a guinea-pig with negative results.

Bacteriological examination of the contents of the bowel of Mrs. P. removed at post-mortem showed the presence of Bacillus Morgan's No. 1.

Comment.—The rapid onset of symptoms after the partaking of food suggests that they were due to toxæmia, rather than to bacterial infection. The guinea-pig results are also suggestive of toxæmia. There is, however, the chance that the guinea-pigs may have been affected by the chemicals used in pickling ; unfortunately no control experiments were done with other samples of corned beef. If the condition was a toxæmia this would account for the negative cultural findings. It is presumed that the causal agent was ingested at the evening meal ; there is the possibility that the previous meal may have been responsible. In any case it would appear as if the meat, if indeed the cause, had been contamined after purchase from the butcher since no symptoms followed meals on the previous day, and the family in the adjoining house was not affected. On the other hand, only a small portion of the meat may have been infected and this may not have been consumed until the Monday.

2. CESSNOCK OUTBREAK (DECEMBER, 1923).

In this outbreak some sixteen persons were affected, after attendance at a wedding breakfast.

History.—The breakfast was held at 6.30 p.m. on 16th December, 1923, about forty guests being present. The food consisted of ham sandwiches, tongue sandwiches, cakes, jellies, fruit, lollies, cordials and tea. The first case of illness occurred about three hours after the meal, and from then till about 11 p.m. the remainder became ill, sixteen persons in all being affected. Three were admitted to hospital; all recovered in a few days.

The symptoms were headache, vomiting, diarrhœa (in some cases) and weakness in the legs.

Inquiries were made as to the number of persons who had partaken of each article of diet and of the number affected or not in each case; the inquiry failed, however, to incriminate any article of food as responsible for the outbreak.

The food partaken of at the breakfast was prepared by Mrs. B. at her private residence. The meats (tongue and ham) were cut up and made into sandwiches. The tongue was purchased from a local butcher on 13th December, cooked in an iron boiler the same day, pressed in an enamel can with a plate on top weighted with bricks, placed in the safe portion of the kitchen dresser and cut up on the 15th December. The ham was ordered from Sydney and was delivered at Cessnock on 11th December; it was boiled on 13th, and cut up on 15th December. A quantity of the ham was left after the meal, and was consumed daily by the B. family.

Bacteriological Examination.—Portion of the ham was submitted for examination, as was also portion of vomit scraped from the ground outside the hall where the breakfast was held. No organisms of the food poisoning group were detected in either specimen.

Comment.—The early onset of symptoms suggests a toxæmia, otherwise no light can be thrown on the origin of the outbreak.

3. FIVE DOCK OUTBREAK (JANUARY, 1923).

A small outbreak of food poisoning occurred in a household at Five Dock in January, 1923; three persons were affected.

History.—Several members of the household of Mr. T. became ill about 3 p.m. on 2nd January. Lunch was eaten at about 1.15 p.m., the food consisting of anchovette paste, bread and butter, tea, and, in one case, treacle. C.G., aged 8 (nephew) first took ill, and was followed by W.M., 1½ (a State child), Mrs. T., 34 years, A.T., 12 years, and H.T., 7 years. A medical practitioner was called in and he ordered the removal of the patients to hospital. W.M. was stated at the hospital to be not suffering from poisoning and was retained merely for observation; A.T. was only slightly ill and was believed to be suffering from shock; he became faint while helping the doctor to administer emetics and only vomited once—in the hospital, over 24 hours later. This boy had no anchovette, but had treacle instead. The baby (W.M.) only had a little anchovette. G.T., another son, aged 13, ate anchovette, but was not ill. At the evening meal on the 1st January the family had salmon, onions, bread and butter and tea. All, including two who were absent at lunch on 2nd, ate all the articles. At breakfast on 2nd January the household had bacon, tomatoes, bread and butter and tea, with the exception of Mr. T., who had eggs, poultry, and bread and butter; the baby had bread and milk. Suspicion fell on the anchovette as the probable source, though some white speckled tomatoes found in the house were also under suspicion.

The remainder of the anchovette, a salmon tin, and a treacle tin were submitted for analysis.

Bacteriological Examination.—The anchovette consisted of 85 per cent. salmon and 10 per cent. other fish. No organisms of the food poisoning group were found in the anchovette or in the salmon and treacle tins. A guinea-pig was inoculated with 1 c.c. of a broth suspension of the anchovette and appeared sick on the following day, but recovered. A second guinea-pig fed with mixed anchovette and oatmeal showed no ill effects.

Comment.—The history suggests a toxæmia and suspicion points to the anchovette, though the tomatoes may have been responsible; these were not examined. The anchovette was of London manufacture.

4. LANE COVE OUTBREAK (March, 1924).

An outbreak, apparently of food poisoning, presenting somewhat unusual features, occurred in the Lane Cove Municipality; in all twelve persons belonging to three households were affected.

History.—The following persons were ill :—Mrs. M., aged 43 ; A. J., aged 26 ; S. J., aged 16 ; E. J. and H. J. (twins) aged 10 ; G. W., aged 6 (grandson) ; M. B., aged 33 (cousin). Each of the above had sausages for tea on 10th March ; the only remaining member of the family, T. J., had no sausages and was not ill. The sausages were purchased on Monday afternoon, 10th March, and fried for the evening meal. During the meal the girl, E. J., became ill and started to vomit. The remainder of the family became ill at short intervals after tea. Violent vomiting, headache, and diarrhœa were the predominant symptoms. The scraps from the table after the meal were given to a cat and a dog and they became ill.

Family S.—Two persons were affected in this family. Mrs. S. and his sister who had rissoles for tea and were ill during the night of the 10th. Mrs. S. and her mother had no rissoles and were not ill. The minced meat was purchased on the afternoon of 10th March and made into rissoles for the evening meal ; the other members of the family had stew. The scraps from the table were given to a neighbour for fowl feeding. The following morning six of the fowls were found dead in the yard and the remainder of the poultry were sick.

Family G.—Three persons were infected—G.J., his brother and a boy ; these persons had sausages for lunch on 10th March and became ill. Mrs. G., who did not eat the sausages was not ill. The sausages were purchased by the boy on the morning of 10th March and were eaten at lunch ; the illness commenced about 2½ hours after the meal, the symptoms being vomiting, headache, and diarrhœa. After the meal, the scraps were given to the cat and dog and these animals were ill after eating the food.

Both the sausages and the minced meat were purchased at the same shop. Mrs. J. and Mrs. S. stated that when the sausages and minced meat were cooked they presented a white frothy appearance. All the patients appear to have made a rapid recovery. The butcher's shop was visited and the premises, utensils, &c., thoroughly inspected and found to be reasonably clean and satisfactory. Specimens of the ingredients used in the manufacture of sausages and in the preparation of minced meat were taken for analysis, as were also some lime used for spreading on the floor and a tin of a fly destructor—Mortein.

Bacteriological Examination.—Specimens of vomit and fæces from the premises of J. were taken on 13th March and submitted for bacteriological examination. These were plated on bile salt neutral red agar, but no bacteria of the food poisoning group were detected.

Two fowls (dead) from the premises of S. were also submitted for examination. Emulsions were made from the craw and gizzard of each bird and placed on bile salt agar ; no organisms of the food poisoning group were found.

Specimens of sausage meat and of minced meat from the butcher's shop were similarly plated, but with negative results.

Chemical Analysis.—Several articles removed from the butcher's shop were submitted to the Government Analyst for chemical examination, as were also the two dead fowls, and portion of the vomit. The result of the analysis is shown below :—

Nature of Exhibit.	Result of Examination.
Fowls, 2	No poison found.
Vomit	No poison found.
McKendrick's powder	Found to be sodium sulphate. Arsenic (calculated as $As_2 O_3$). 0·5 grains per lb. Excepting the arsenic no poisons were found.
Bi-sulphite of lime (solution)	No poisons found.
Quicklime	This is not quicklime, but sulphite of lime and soda. Arsenic (calculated as As_2O_3) 0·4 grains per lb. Excepting the arsenic no poisons were found.
Seasoning	No poisons found.
Flour	No poisons found.
Mortein	Found to consist of powdered pyrethrum flowers. No other poisons present.

Samples of the sausage meat and minced meat were later submitted, but no poisons found. The mince meat contained sulphur dioxide 0·7 grains per lb. and the sausage meat 11·8 grains per lb. The sample of mince meat had an offensive smell on receipt.

Comment.—The rapid onset in the case of members of the family J. is very unusual in bacterial infection or toxæmia. The period of 2½ hours in the case of family G. between eating of food and onset of symptoms is, however, in keeping with a toxæmic process.

It is to be noted that, while the illness followed after the eating of sausages in two cases, it was after mince-meat in the other family. This is probably explicable on the assumption that as is very probable some of the ingredients of the mince and sausage meats were identical. Both may have been contaminated, however, from some common cause after preparation.

In some ways the circumstances suggest the possibility of a non-bacterial poison being the cause. A small quantity of arsenic was found in solutions and powders in the shop. These substances were probably used for preservative purposes, but even so the amount of arsenic that could be consumed in a sausage would be infinitesimal.

The immediate vomiting during the meal may have been a psychical phenomenon due to some distaste, but the subsequent continued diarrhœa, vomiting, and headache are evidence of a toxic process. The fact that no bacteria could be isolated from the vomit, fæces, or fowls does not disprove a bacterial cause, as the process would appear to be a toxæmia, rather than a bacterial infection of the patients.

The effects produced on domestic animals and fowls may similarly be due to a bacterial toxin, as many of the members of the food poisoning group were originally isolated from infected animals.

5. FAIRYLANDS PICNIC OUTBREAK (December, 1923).

Some 50 members of a picnic party were affected, the illness starting about 1½ hours after lunch.

History.—The picnic party composed of members of a lodge and totalling 130 persons had an outing at Fairylands on 9th December, 1923. Lunch was served about 1 p.m. The menu included cold pressed ox tongue, roast pork, potatoes and salad (lettuce, onions, cucumber, beet-root), jelly, tinned peaches and custard, fresh fruit, bread and butter and tea. About 1½ hours after the lunch various members of the party became suddenly ill with colic, vomiting, and diarrhœa, accompanied by a good deal of collapse. Emetics were administered by other members of the party and arrangements made to transport patients to hospital. Fourteen persons were admitted to the Balmain Hospital and about thirty received treatment and left for their homes. Two persons were admitted to the Royal North Shore Hospital and one treated there. All the patients eventually recovered. The catering was done by a firm in Stanmore, which carries out catering for picnic parties in a large way ; on the same day four other picnic parties, totalling 200 persons, were catered for and none of the members of these suffered any ill effects. The pork was obtained on Thursday and Friday and the tongues on Friday, 7th December. They were cooked between noon and 4 p.m. on the 7th December and placed in a cool chest until Sunday, 9th. A large number of the picnickers were interviewed as regards the articles consumed and suspicion fell on the ox tongue.

Bacteriological Examination.—Specimens of scraps obtained from a garbage tin used by the picnickers were obtained, as was also some of the vomit. The scraps consisted of ham, pork, tongue, jelly, cream. No organisms of the food poisoning group were detected. No pathogenic organisms were found in the vomit. Four samples of water from the copper used for boiling water and from the water tanks also gave negative results. Four specimens of fæces and one of vomit obtained from patients in hospital failed to show the presence of organisms of the food poisoning group.

Comment.—The rapid onset of symptoms and the negative bacteriological results suggest a toxæmia ; the source was not traced, though suspicion fell on the tongue.

6. WAVERLEY OUTBREAK (FEBRUARY 1926).

In this outbreak two families in one house were affected; six persons in all were reported to be ill. From inquiry it appeared that on the morning of 6th February, Mrs. T. purchased an ox tongue from a butcher's shop in Woollahra and a leg of lamb from another shop in the same suburb. The meat was cooked that afternoon, the tongue in an iron saucepan and the lamb in a tin meat dish. The tongue was afterwards placed in a basin and allowed to cool on the front verandah. Overnight it was placed in a cloth and tied to a clothes-line in the yard. The meat was eaten at dinner on the 7th (Sunday). At that meal Mrs. T. and R.T. (35 years), a son, partook of tongue. Before the evening meal R.T. became ill with vomiting, diarrhœa, and shivering; Mrs. T., who only had a little of the tongue, was not affected; the other persons did not partake of tongue, but ate the lamb. At the evening meal on the Sunday all present partook of the tongue; this meal was about 7 p.m.; about 9 p.m. Mrs. M. (27 years) became ill with vomiting, diarrhœa, and shivering, and Mr. M. (30 years) was attacked almost immediately. At short intervals F.M. (6 years), B.M. (1½ years) and F.T. (16 years) became ill. A medical man was called in and he ordered the removal of the six persons to hospital, where Mr. and Mrs. M. were retained and the others allowed to return home after treatment.

Portions of the tongue and lamb were secured for bacteriological examination, and also some vomit. Inspection was made of the two butchers' premises, but nothing found that would account for the outbreak.

Mr. and Mrs. M. remained in hospital until the 11th February, when they were discharged.

Bacteriological Examination.—The ox tongue, lamb and vomit were cultured, but no organisms of the food poisoning group were discovered.

Specimens of fæces were obtained from Mr. and Mrs. M., and of urine from Mr. M.; these were plated, but no organisms of the food poisoning group were detected.

Comment.—The inspector expressed the opinion that "the trouble was caused by careless handling of the foodstuffs after cooking, and the absence of proper storage facilities during the warm weather experienced over the week end."

It appears, however, more reasonable to attribute the cases to toxins contained in the meat. It is well known that *Salmonella bacilli* will secrete toxin in a medium such as meat, and that these toxins are not destroyed by boiling. In support of the toxin being the cause of the cases is the short interval—two hours in shortest cases—between the partaking of food and the onset of symptoms. This is presuming that the infected food was the ox tongue. The fact that of the two persons who partook of tongue at the mid-day meal one was affected some time during the afternoon and the other, who is said to have consumed only a little of the tongue, escaped, while all who partook of tongue at the evening meal were affected, points to this article of food being responsible. Members of the *Salmonella* group are known to occur in the intestine of cattle and its presence on the tongue is thus feasible. The failure to isolate any bacilli of the food poisoning group is also in favour of the toxin theory, as the bacilli themselves would be killed, whereas the toxins would remain unaffected.

7. HAMILTON OUTBREAK (December, 1922).

A small outbreak of food poisoning occurred in a family in Hamilton, a suburb of Newcastle; the whole family (five persons) were affected and two children died.

History.—It appears that a neighbour living opposite (Mrs. S.) ordered 3–4 lb. of veal from a butcher; as the veal was unobtainable, topside (young beef) was substituted. This was delivered on the morning of the 9th December (Saturday) at about 9 a.m., was cooked at 10.30 a.m. and eaten by three persons in Mrs. S's. family for lunch and also cold on Sunday without ill effects. The meat was not finished on the Monday and was given to Mrs. U. The U. family had lunch on Monday (12.30 p.m.) from the meat with the exception of J.U., who was at school. At the evening meal (5.30 p.m. all, including J.U., partook of meat. Mr. U. left for work at 9.30, complaining of feeling a bit sick. An hour later Mrs. U. felt sick, also the little girl, M.U., and the boy, A.U., complained of sickness and soon after vomited. J.U. awoke with pains and vomited about 1:30 a.m. on Tuesday morning. The whole family suffered with diarrhœa and vomiting throughout the night and a medical practitioner was called in early in the morning. Vomiting and diarrhœa continued through the day and the condition became so serious that the doctor ordered the three children to be sent to the Newcastle Hospital. Mr. U., who had become worse at his work, was taken to hospital by ambulance early on the Tuesday morning. The little girl, M.U., died on the 12th about 15 minutes after admission, and the boy, H.U., on the following morning.

Autopsy was carried out at the hospital. Nothing abnormal was discovered in heart, kidneys, liver or spleen; stomachs were empty, with the exception of a little bile in the stomach of the boy—hardly any congestion was present. Following the small intestine back, typical typhoid-like ulceration was found in the small bowel; a slight hæmorrhage was present in one of the ulcers in the case of the little girl; an almost perforated ulcer was also present; lymphoid tissue enlarged and mesentery congested; mesenteric glands also enlarged. In the case of the little girl there was slight pleural effusion at the base of left lung. In the little boy there was slight bronchitis. Both cases showed acute congestion of the brain.

No sample of the meat could be procured for examination. Inquiries made from other families who had purchased meat from the same carcase failed to discover any other cases of illness.

Pathological Examination.—Portions of the ulcerated intestines were forwarded to the Microbiological Laboratory for examination. Unfortunately the tissue was preserved and cultures could not be made.

In the case of the girl, M.U., the gut showed marked hyperplasia of the lymphoid tissue; microscopically there was erosion of the mucosa, which was infiltrated by small round cells; the superficial portion of the mucosa was almost competely exfoliated. While portion of the erosion may have been post-mortem, this would not account for the inflammatory changes evidenced by the presence of the infiltrating cells.

In the case of the boy, H.U., the gut showed one or two circumscribed ulcers. Microscopically there was erosion of the mucosa and small celled infiltration of the deeper layers.

Specimens of blood serum were submitted from Mr. U. and J.U.; these gave no agglutination with typhoid, paratyphoid or Gærtner's bacilli.

Comment.—It appears evident from the history of the cases and from the lesions in the bowel in the two children that died that there was definite bacterial infection present. This is supported by the fact that two out of the five cases proved fatal.

How the infection occurred must be more or less a matter of speculation. If the meat were the cause it would appear to have been itself infected after it had been eaten by the S. family. Such infection is possible at the hands of a carrier or by contamination with infected material, *e.g.*, mouse or rat dung. There is no certainty that the meat was the vehicle of infection and some other food may have been infected, but the inquiries made failed to suggest an alternative source.

8. NATIONAL PARK PICNIC OUTBREAK (MARCH, 1923).

An extensive number of cases of food poisoning occurred at a picnic given by a large city firm on 24th March, 1923. In all 114 persons were affected.

History.—The illness manifested itself on the Sunday morning following the picnic on Saturday afternoon, 24th March. The party consisted of the staff of the shop and factory, together with relations and friends, numbering in all about 300. The catering was done by the lessee of the Rest House at National Park. On Monday a considerable number of the employees reported that they had had "bilious attacks and diarrhœa;" others were worse and had been attended privately by doctors.

The foods principally partaken of were poultry, ham, pork, tongue and ice cream; the latter was almost universally eaten by the party. Water was drunk by many during the afternoon; it was obtained from water tanks. On the other hand, many of those who drank the water and ate the ice cream had escaped ill results. The evidence in regard to other foods and cordials was conflicting—114 persons were affected. The following table shows the number who partook of the various foods provided:—

Poultry	105
Pork	19
Ham	68
Tongue	74
Vegetables (potatoes and beans)	104
Salads	82
Sweets	103
Ice cream	110
Cordial	99
Water	65

The symptoms present were diarrhœa, vomiting, headache, abdominal pains and pain in back. In a few cases one or other of these symptoms were absent, but diarrhœa and abdominal pains were almost universal. Apparently a large number of the cases were not seriously ill. A few persons were taken ill the same evening (Saturday), a few hours after partaking of the meal at 6.30 p.m. A number were affected during the early hours of Sunday (25/3/23) and later on that day. Several of the cases were seriously ill, requiring medical attention; one was ill for ten days; another for six days, and one or two for several days.

Bacteriological Examination.—No specimens of excreta from any of the patients or persons who prepared or handled the food stuffs were submitted for examination, nor were any of the food stuffs obtained. Serum from three patients were tested against Paratyphoid A and B and Gærtner's bacillus. All gave negative agglutination.

Comment.—The evidence is too conflicting to incriminate any one article of food, though suspicion falls on the ice cream. There is the possibility that the infection may have been conveyed by a carrier handling the food, in which case infection may have been transferred to more than one article of food handled by the carrier. The history of the onset of symptoms indicates that the cause was bacterial infection, not toxæmia; unfortunately in the absence of bacteriological investigations it was impossible to determine the species of bacteria responsible.

9. NARRABEEN OUTBREAK (MARCH, 1924).

These cases occurred in a boarding establishment in Narrabeen; thirteen persons were affected.

History of Outbreak.—Approximately about half the number of occupants of the boarding-house were affected, the general opinion being that the illness was caused by something eaten on the 8th March (Saturday) at the evening meal. This meal consisted of roast beef, corned beef, tongue, bread and butter, sweets, fruit and cream. The first cases occurred between 5 and 6 a.m. on Saturday, 9th March, the remainder of the cases following at short intervals. The cases were treated by a local practitioner. The doctor was interviewed and he stated that he was called to the house early on Sunday, 9th March, that he treated thirteen cases of what, in his opinion, were food-poisoning cases. The doctor recommended their removal to hospital, but at the patients' request agreed to treat the cases in the house provided trained nurses were engaged. The doctor stated that several of the cases were severe, whilst others were mild and quickly recovered. He attributes the cases to tinned cream. It appears that three tins of cream were delivered to the house by a large milk distributing company from their Manly depôt; two of the tins were consumed at the evening meal on the 8th; the third was not used, but was destroyed and was not available. It appears from the doctor's information that all who had cream were ill, while in one particular case the only food partaken of at the meal was cream, and that person was affected. A request was made for the submission of specimens of blood serum and fæces from the patients, but these were not received.

Comment.—In the absence of bacteriological examination it is impossible to prove the causal agent of the outbreak. The interval between the time the food was eaten and the onset of symptoms (eleven to twelve hours) suggests that the illness was due to actual infection and not to a toxæmia without bacterial infection. If, as seems likely from the evidence, the cream was implicated, this is rendered more probable since the cream would be consumed raw, though it may possibly have been pasteurised.

GLEBE POINT OUTBREAK (NOVEMBER, 1925).

10. The outbreak occurred in a Girls' Home at Glebe Point, some thirty-five out of forty-two girls in the home being affected.

History.—The home is one of three separate and distinct buildings or "homes," which, together, accommodate 144 girls of ages ranging from 5 to 15 years. A fourth building is utilised as administrative quarters and for the accommodation of the staff.

On Wednesday night (25th November, 1925) two girls, aged 8 and 9 years, became ill; symptoms were vomiting temperature up to 102 deg. F. and headache. Neither marked pain nor diarrhœa were present. Before 11 a.m. on 26th instant twenty-five to thirty girls were similarly affected and subsequently others took ill until thirty-five out of a total of forty-two girls were affected. All were in the one home; girls in the other homes were not affected.

All the homes and the administrative quarters are supplied with food from one central source, so that if any article of diet were the cause one would expect the other homes to have had cases of illness also.

The daily menus of the week were considered in some detail, but no article of food could be incriminated since the same food was distributed throughout all the homes and was common to those affected and those who remained well.

Meat pies were served at tea-time on Wednesday night throughout each of the homes. If these were the cause it is peculiar that out of the whole batch of many dozens only those children in the one home were affected. The staff also ate the pies, but none became ill.

Bacteriological Examinations.—Sera were obtained from five patients on the 27th November; these gave no results by agglutination tests against paratyphoid and Gærtner's bacilli. Fæces were obtained from ten patients and plated on bile salt agar. In six cases organisms were isolated which agreed in cultural reactions with members of the food-poisoning group.

Cultural Reactions.

Culture.		Milk. 1 day–15 days.	Glucose.	Mannitol.	Dulcitol.	Lactose.	Saccharose.	Arabinose.	Sorbitol.	Indol.
18745	R.P.	alk.	A.G.	A.G.	—	—	—	A.G.	—	+
18722	R.P.	alk.	A.G.	A.G.	A.G.	—	—	—	A.G.	—
18746	E.H.	alk.	A.G.	A.G.	A.G.	—	—	A.G.	A.G.	—
18747	K.S.									
18748	T.S.									
18749	D.D									
18750	M.R.									

Several of these cultures were tested against patients' sera in a dilution of 1/60. These sera were taken on 31st December. The following results were obtained :—

Sera.

	D.D.	R.P.	V.B.	K.B.	K.S.
18722 R.P.	—	—	—	—	—
18745 R.P.	—	—	—	—	—
18746 E.H.	+	—	?+	—	+
18747 K.S.	+	—	—	—	+
18748 T.S.	+	—	+	?+	+
18749 D.D.	+	—	?	—	+

It will be seen that two sera (D.D and K.S.) gave complete agglutination with four of the cultures in a dilution of 1/60; these included in each case the culture isolated from that patient; in two other cases, V.B. and K.B., partial agglutination was given with one or more of the four cultures, but no cultures were available from these cases; one, R.P. did not give any agglutination either with the cultures isolated from here or with any of the other four cultures. It would appear that cultures 18746, 18747, 18748 and 18749 are probably identical, while 18722 and 18745, both isolated from R.B. on different days, are distinct.

Three of the cultures, 18747, 18748 and 18749, were tested against *B. paratyphosus*, *B. enteritidis* (Gaertner) and *B. aertrycke* in dilutions of 1/5000 to 1/40000, but gave no agglutination; as the titre of the sera was high in each case, it is probable that the organisms belong to some other type of the Salmonella group. Unfortunately, it was not possible to test the organisms against other members of the group, such as *Newport*, *Stanley* or *Suipestifer*. Cultures have been kept and it is hoped to extend the serological tests when opportunity permits.

5. MOSQUITO SURVEYS IN SOME INLAND TOWNS OF NEW SOUTH WALES.

Beyond the Dividing Range in New South Wales and over the country drained by the Darling-Murray River system, experience has shown that but few species of mosquitoes occur, but that these are widely distributed over this region. Five species will be found practically throughout the area :—*Anopheles annulipes*, *Aedes* (*Ochlerotatus*) *sagax*, *Aedes* (*Ochlerotatus*) *theobaldi*, *Culex fatigans* and *Culex annulirostris*. The limits of *A.* (*Ochlerotatus*) *sagax* to the north are uncertain, but it has been taken at Bourke; certainly it appears common in the south of the area. I include under this name specimens identified as *A.* (*Ochlerotatus*) *wilsoni*. Similarly the limits to the south of *A.* (*Ochlerotatus*) *theobaldi* are undefined, but specimens have been taken at Leeton on the Murrumbidgee Irrigation Area, though the species appears to be commoner in the north of New South Wales.

In the northern portion of this area another species is common; this is *Aedes* (*Stegomyia*) *argenteus*, better known as *Stegomyia fasciata* or *Aedes ægypti*. This is essentially a house mosquito and its distribution has been moderately well defined in consequence of the recent Dengue outbreak; it has not been recorded from the south of the area.

Other species found in this inland basin are *Aedes* (*Chatocruiomyia*) *humeralis*, known from near Cobar in New South Wales, but probably widely distributed as it occurs also in Queensland and South Australia; *A.* (*Ochlerotatus*) *vittiger*, recorded from Narromine; *A.* (*Finlaya*) *notoscripta*, recorded from Grenfell and Dubbo; *A.* (*Finlaya*) *alboannulata*, recorded from Locksley, Orange, Manildra, Narromine and Barmedman. These last three species are common and widely distributed in the coastal regions. What is probably a new species of mosquito was recently discovered at Barmedman, but it has not yet been identified. Neglecting this last species there are ten different mosquitoes definitely known to occur in inland districts in New South Wales west of the Main Divide. These ten species may be divided into species breeding around houses and species breeding in swamps and streams; salt swamp breeders are generally absent from the areas, though Taylor records *Mucidus alternans* from Kyabram on the Goulburn River in Victoria. Of the species found breeding around houses two are known to occur within the area—*Culex fatigans* throughout and *Aedes argenteus* in the northern parts. But little is known of the breeding habits of the other species. *Anopheles annulipes* is a swamp and billabong breeder. It has been found breeding in the overflow drains from the irrigated land on the irrigation settlement at Yanco and in billabongs alongside inland rivers; it probably breeds also in swamps and in drains. *Aedes* (*Ochlerotatus*) *sagax* and *A.* (*O.*) *theobaldi* are both day biters and probably swamp breeders, though the larvæ of neither species has been found.

Aedes (*Finlaya*) *alboannulata* has been found breeding in a swamp at Barmedman, but will also breed in water barrels. *A.* (*F.*) *notoscripta* is similarly a semi-domestic species breeding in tubs, water barrels, &c., though it will also breed away from habitations.

Culex annulirostris has been found breeding in billabongs, drainage channels, &c.

In view of the wide distribution of most of the types found in inland New South Wales, the account of a mosquito survey of Narrandera is given, as this will apply—*mutatis mutandis*—to many country towns in New South Wales which are similarly situated. It is to be noted that Narrandera is beyond the limits of the distribution of *A. argenteus*; it has been thought advisable, therefore, to give also short accounts of surveys made in towns in northern New South Wales during the Dengue epidemic.

MOSQUITO SURVEY AT NARRANDERA (MARCH, 1925).

Narrandera is a town of 3,000 inhabitants and is situated on the north bank of the Murrumbidgee River. It is connected by rail with Sydney, being on the South-Western line and with Melbourne through the Jerilderie-Tocumwal line. By rail the town is 353 miles from Sydney.

The town was originally laid out on the flats bordering the north bank of the Murrumbidgee, but it is now placed on a sandy slope farther back from the river, from which it is separated by a flood plain and the Murrumbidgee Irrigation Canal.

Soil.—The soil is a sandy loam, very absorbent, so that water does not collect on the surface. The flood plain is covered with a clayey alluvium and is traversed by a creek—the Bundidgerry Creek.

Water Supply.—The town is supplied by water pumped from the river in front of the town, the intake pipes being situated in the bed of the river. Owing to these becoming blocked when the river is low arrangements are being made to obtain water from the irrigation canal. The river water is taken to two large reservoirs on the north of the town from whence the water is supplied to the town reticulation. In addition most of the houses possess galvanised iron tanks for rain water. These are used more in the winter when the river water is muddy.

Climate.—The summer is as a rule dry and hot, the winter cold and frosty with a fair winter rainfall due to antarctic disturbances. The present season (1925) has been exceptional in the amount of rain which fell during the summer.

Mosquito prevalence.—Mosquitoes are stated to be always very prevalent during the summer, and it was stated that the present summer had been worse than usual. During my visit owing to a cool spell the prevalence was said to be less than usual, but there was plenty of evidence of the presence of these pests. The chief mosquito present is the night biting house mosquito, *Culex fatigans*, but complaints were also received of a day biting species occurring out of doors. The culprit in this instance is probably *Culex annulirostris* Skuse, of which I took a few specimens.

Water Collections and Breeding Sites.—The principal water collections in and around the town are as follows :—

(1) The household tanks.—These are for the most part cylindrical tanks of corrugated iron to receive rain water from the roof guttering. Most of the tanks are provided with flat iron covers with an opening for the entrance of water from the spouting. In many instances this opening is protected by perforated covers, in other cases it is open and in the best protected tanks this opening is covered with wire mesh. In most of the tanks the overflow pipe at the top is open, but may be covered with wire mesh.

A number of tanks were tested; where protected even if protection was not perfect, no breeding was found. In other cases where the tops were more or less open, breeding was proceeding actively, the species present being *C. fatigans.*

(2) The Storm Water Channel.—This is kept flowing by the waste water from the power house, it is concrete lined, and crosses under the Murrumbidgee Irrigation Canal by a siphon, on the near side of which is a settling tank. The channel eventually discharges into Bundidgerry Creek. No breeding was found in any part of this channel, nor in the settling tank. Adult mosquitoes were however common along the banks.

(3) Ornamental Pond in Public Park.—Only two small larvæ were found in the pond. These were not larvæ of *C. fatigans* and this source of breeding may be neglected.

(4) Reservoirs on Top of Hill.—No breeding found in these.

(5) Murrumbidgee Irrigation Canal.—This runs along the southern border of the town. The banks are steep, clean cut, though a slight growth of reeds, &c., is present along the edges. The current is swift and no breeding was found here.

(6) The Murrumbidgee River.—No breeding was found in the main stream. In addition to the main channel several water holes are situated within the banks, more or less connected with the river according to the state of the latter, i.e., whether high or low. No breeding was seen in these holes, but in a pool in a branch connecting the river and Bundidgerry Creek a few culicine larvæ were found, probably of *C. annulirostris* which was present in the vegetation around.

(7) Bundidgerry Creek and Water Collections on the Flood Plain.—Between the river and the Irrigation Canal is a plain traversed parallel to the river but at some distance from it by a series of pools or billabongs collectively forming Bundidgerry Creek. In addition other pools are present on this plain, while on the opposite side of the river similar pools and billabongs occur.

These pools are well stocked with predaceous forms of life, beetles, dragon fly larvæ, &c., and support little mosquito life except in pools that are more or less covered with aquatic plants amongst which culicine larvæ (*C. annulirostris*) were found in small numbers.

The storm water channel discharges into this creek, and adjacent to the outlet the creek also receives the effluent of the septic tank which treats the whole of the town sewage and which is situated between the tank and the creek. The whole of the creek is liable to be washed out in heavy rains or with a rise in the river; at the time of my visit however the following conditions existed as regards mosquito breeding :—

(a) In the pools above the entrance of the septic tank effluent little breeding was occurring, and only a few larvæ of a species of *Culex* (*? C. annulirostris*) being taken ;

(b) below the entrance of the septic tank effluent mosquito breeding was proceeding to a tremendous extent, literally millions of mosquitoes must be breeding in this area.

In one pool, not in the creek but underneath the overflow pipe of the septic tank, the surface of the water was black from the numbers of larvæ present. The creek bed is more or less choked with vegetation particularly in the lower parts and among the weeds breeding was proceeding as far along the creek as I tested—a distance of approximately half a mile (Billy Goat Flat). At the latter point Anopheline larvæ were found, but otherwise all the larvæ seen were of the common house mosquito, *Culex fatigans.*

(8) Water collections on Chinamen's gardens. These gardens are situated on the bank of the river and are irrigated by water pumped up from the bed. This water traverses the gardens in a series of channels, except in one place no breeding was found in these, but *Culex fatigans* was breeding in a small tub of manure water.

(9) Other Collections of Water.—Some pools were investigated to the west of the town, these are on the flood plain and are similar to those previously visited; they were free from vegetation and no mosquito breeding was found.

An ornamental fountain in the garden of a house under construction had on the surface of the water numerous rafts of eggs of *Culex fatigans*, though no larvæ were found in the fountain.

The fire buckets at the station showed numerous larvæ of *Culex fatigans.*

(10) Cisterns.—As Narrandera is on the water carriage system of sewerage, the question of breeding in the closet cisterns was considered, most of these however are covered in and in any case the flushing would minimise though not entirely prevent breeding.

Measures for Controlling Mosquito Breeding.—It will be seen from this survey that the principal breeding sites are (*a*) The household tanks, and (*b*) Bundidgerry Creek below the outfall of the septic tank.

The tanks can be readily controlled by compelling the openings to be properly screened. This would entail applying the provisions of Ordinance 41 under the Local Government Act to the Municipality of Narrandera.

The question of the control of the breeding in Bundidgerry Creek is a much more difficult one. As this area is outside the residential portion of the town it has been asked whether the mosquitoes from this source would invade the town. It has also been pointed out that the creek is to the south of the town and that when the wind is from that quarter it is a cold wind and the mosquitoes disappear. The area in question however though outside the residential area is at no great distance away and in my opinion the mosquitoes could easily reach the town without the aid of the wind. It is questionable to what extent the prevalence in the town is due to mosquitoes bred in tanks or in the creek. In any case however I think an effort should be made to control breeding in the creek.

Oiling.—It has been suggested that the breeding in the creek might be controlled by oiling. I am doubtful whether it would prove sufficient. The creek is broken into a series of pools in the upper course, but in the lower part the accession of the water from the storm water channel and from the septic tank has formed a practically continuous stream. The flow in this is fairly fast where the effluent enters the creek but rapidly lessens and in the lower portions there is no noticeable current and the surface is more or less covered with vegetation. Oil therefore put on the stream in the upper portion would probably not penetrate the vegetation on the lower; otherwise it might be possible to efficiently oil the creek by a drip method or by sinking a bag containing oil soaked sawdust in the bed of the stream. The other method would be to spray the whole of the course of the stream below the entrance of the sewage effluent. This spraying would require to be done once a week.

Choice of Oil.—Kerosene is largely used but is not the most efficient as it is too volatile; better results may be obtained by mixture with a heavier oil. It may be possible to obtain a crude oil which will act efficiently, but if the oil does not spread uniformly it may require to be diluted with kerosene. The choice of oil depends largely on the cost, the oil to be used being the cheapest procurable that will act efficiently. A mixture of two parts castor oil to 100 parts kerosene has been advocated as more efficient than kerosene alone.

The objections to oiling would appear to be mainly the problem of the proper spread of the oil in the vegetation and the necessity of constantly applying the oil, at least once a week. These objections could be met to a large extent by clearing the creek of vegetation and allowing the water a clear run, the spraying might then be replaced by the drip method or by the sawdust bag.

The use of *Larvicides* such as carbolic acid, lysol or other phenol or cresol preparation, is open to the same objections. A larvicide should be toxic to larvæ in high dilution, rapid in action, uniformly toxic, stable, cheap, rapidly miscible with all sorts of water, non-toxic to man or domestic animals. It is doubtful if any one larvicide possesses all these qualities. The question of toxicity to domestic animals would be an important point in the present case.

Vegetable Growth.—An alga *Chara hispida*, a native of Spain, has been advocated as a deterrent of mosquito breeding. No material is at present available. Similarly I am informed that lemon grass is being largely planted in Eastern Africa as a deterrent. Further enquiries are being made into these plants.

Canalisation, &c.—The methods discussed above can be regarded only as palliatives, or temporary measures, better and permanent results would have to be secured by other measures. Two procedures are possible: (*a*) the creek is a natural drainage channel and is not productive of mosquito life except where contaminated by sewage effluent, if the latter be not discharged into the creek the conditions would be much less favourable to breeding. One proposal therefore is that the septic tank effluent should be carried in pipes and discharged direct into the river. The pipes could not be taken in a straight line as this would interfere with the bathing pool. (*b*) The creek as a whole might be canalised to ensure a uniform and quick flowing stream free from vegetation.

It was pointed out to me that the creek is subject to inundations which would seriously interfere with the canalisation scheme. Unless the canal were constructed of solid material a concrete drain or an earthen drain with concrete invert would probably be required. The question of cost would here be an item of consideration.

It is to be noted that objection might be raised to any proposal to deliver the septic tank effluent into the river. The effluent at the present time probably eventually reaches the river but must be further purified in its passage down the creek. The nearest settlement down stream—Darlington Point—is about 40 miles away, but there are homesteads, &c., on the river between the two towns.

Chemical Analysis.—Pursuant to a request made to the local authority at Narrandera samples of sewage effluent and of water were submitted to the Government Analyst. The object of these examinations was to determine (*a*) whether the septic tank effluent was capable of further treatment; (*b*) whether the hydrogen-ion content would throw any light on the choice of water for breeding by *Culex fatigans.*

The following samples were submitted:—

(*a*) The septic tank effluent.
(*b*) The creek water above the outfall.
(*c*) The creek water below the outfall (200 yards below outfall).
(*d*) The river water.

Copies of the results of the analyses are given below. These show that the filtrate from the septic tank undergoes considerable purification in its passage along the creek. The difference in hydrogen-ion content between the samples is so slight as not to throw any light on the question of breeding of *Culex fatigans*.

Report of Government Analyst on Chemical Analysis of a sample of septic tank filtrate, taken 4th May, 1925, at Sewage Purification Works, River Flat, Narrandera :—

Physical Characters.		*Chemical Characters.*	
Colour	Brownish.	Total solid residue	47·0
Transparency	Turbid.	Suspended solids	......
Odour	Offensive.	Chlorine as chlorides	6·4
Reaction	Alkaline.	Free and saline ammonia	4·00
		Albuminoid ammonia	0·50
		Nitrogen as nitrites	0·000
		Nitrogen as nitrates	0·002
		Oxygen absorbed in 15 minutes	1·12
		Oxygen absorbed in 4 hours	2·70
		Hydrogen-ion concentration	7·7

Report of Government Analyst on Chemical Analysis of three samples of water : "*B*" from creek above sewer outfall ; "*C*" from creek below sewer outfall ; "*D*" from Murrumbidgee River, at Narrandera.

Physical characters.	"*B.*"	"*C.*"	"*D.*"
Colour (in 2 feet tube)	Brownish	Brownish	Greenish.
Clearness	Turbid	Turbid	Slightly turbid.
Odour	Slightly organic	Slightly organic	Slightly organic.
Reaction	Slightly alkaline	Alkaline	Slightly alkaline.
Sediment	Fair amount	Fair amount	Small amount.

Chemical characters.	"*B.*"	"*C.*"	"*D.*"
Total solid residue	19·0	28·5	12·40
Chlorine or chlorides	1·1	6·0	1·8
Free and saline ammonia	0·026	2·00	0·010
Organic ammonia	0·062	0·106	0·007
Nitrogen as nitrites	0·000	0·040	0·000
Nitrogen as nitrates	0 005	0·025	0·025
Oxygen absorbed in 15 minutes	0 255	0·425	0·060
Oxygen absorbed in 4 hours	0·420	0·655	0·100
Permanent hardness	...?..	......	......
Total hardness	......	......	......
Poisonous metallic contamination	......	......	......
Alkalinity (as calcium carbonate)	9·0	17·0	6·0
Hydrogen-ion concentration	7·45	7·5	7·7

Mosquito Surveys in Northern Towns—*A.*—Inverell; *B.*—Moree; *C.*—Bourke.

A. Inverell.

Inverell is a town of about 5,000 inhabitants, situated on the banks of the Macintyre River; across the river from the main town is Ross Hill—a residential suburb. The river is dammed by a weir at the town and below the weir is largely a dry bed containing waterholes of varying length. There is no municipal water supply, though efforts are at present being made to put down a bore at the power house, the bore is down about 250 feet but a sufficient supply has not yet been struck. For water the town depends on the individual rain water tanks.

Breeding Grounds.—The possible breeding grounds for mosquitoes may be classified under three headings (1) River pools, (2) Tanks and (3) Odd collections of water.

(1) River Pools.—Several pools were examined in the bed of the Macintyre River beyond the weir. Around the edges a few larvæ of *Anopheles annulipes* and *Culex* sp. (?) (probably *C. annulirostris*) were found. No evidence of the presence of *Aedes* (*Stegomyia*) *argenteus* (*Stegomyia fasciata*) was found.

(2) Tanks.—All premises both in the town and in the suburbs possessed galvanised iron tanks. They were of different capacity, but almost universally cylindrical in shape with flat top containing a round opening to receive the rain water and an overflow pipe at top. The opening was generally fitted with a perforated depressed galvanised iron strainer, in some cases protected by wire gauze, in most cases without the gauze. The overflow pipe was generally uncovered, though in some cases protected by wire gauze. Instances were found where the top of the tank was broken or where the strainer was missing.

Many of the tanks had been protected further by the addition of a covering of kerosene or liquid paraffin, but in a few instances mosquito larvæ were found in tanks, apparently both *C. fatigans* and *Aedes argenteus* were represented.

(3) Odd Collections of Water.—In one or two instances odd collections of water were found about dwellings. These include horse troughs, old kerosene tins, disused tanks, trays under drip safes, &c. Breeding was found in one horse trough in the centre of the town, the species present being apparently mainly *C. fatigans*; in other instances breeding was found in old kerosene tins and from one of these *Aedes argenteus* was obtained.

Adult Mosquitoes.—These could not be described as abundant, but *C. fatigans* was noted in the hotel and I was bitten by at least two *Aedes argenteus* when talking to the Town Clerk in the Municipal buildings. I was informed, however, that mosquitoes had been unduly prevalent and the active measures already put in force have probably done much to limit the numbers of adults.

Preventive Measures.—I found that precautions had already been taken by the Municipal Council and operations were in train to eliminate the mosquito.

Householders had already been warned of the necessity of preventing mosquito breeding and the provisions of Ordinance 41 had been put in force.

The public had been advised that all water tanks, horse troughs, &c., must be covered with kerosene or paraffin and that all refuse be removed from the premises at least once a week.

The kerosening of tanks was insisted upon for the reason that the covering of tanks with wire mesh throughout the town would take a considerable time and furthermore that the workmanship could not be depended upon. While therefore the local authority is requiring that tanks be efficiently protected by wire mesh, it is at the same time insisting on the use of paraffin or kerosene.

Paraffin is advocated as it imparts no taste to the water as in the case of some brands of kerosene. It has the disadvantage of not forming a good film on the surface.

Few people are, however, objecting to the taste of the kerosene. To ensure compliance with the ordinance the Health Inspector has been given assistance and a house to house inspection is to be instituted at once and it is proposed to prosecute any householder or occupier upon whose premises mosquito breeding is taking place.

To facilitate the removal of rubbish, the fortnightly garbage service has been converted into a weekly service.

The pools in the river bed are being oiled regularly though I do not consider that these constitute a breeding ground for *Aedes argenteus.*

B. Moree.

Moree is a town of about 3,500 inhabitants, situated on the banks of a branch of the Gwydir, known as the Mehi, which is probably the original channel of the river. About three miles to the north is the main channel of the Gwydir generally known locally as the Big River. Connecting the two and traversing the town obliquely is the Broadwater, a dry channel which fills with a rise in the river and then runs as a rule back from the big river into the Mehi. The bed of the Mehi is dry except for rapidly drying water holes.

Water Supply.—The town is supplied from a bore situated in the town at the back of the Council Chambers. Most of the residences, the hotels and many business places also possess rainwater tanks for drinking purposes.

Breeding Areas.—Tanks.—These were of the same pattern as at Inverell, but many were completely dry and had been so for some time. Others were protected by wire mesh, but the majority had only a perforated galvanised cover or even no cover at all. Mosquito breeding *Culex fatigans* and *Aedes argenteus* were found in several tanks, both in the business portion, in East Moree, which lies to the east of the Mehi, and in Frog Hollow—a low-lying locality, near the Broadwater.

Horse troughs.—Breeding, mainly *C. fatigans,* was found in a horse trough in the yard of the Hotel Victoria, near the station. The water tanks in the same premises also contained mosquito larvæ.

Odd collections of water.—Breeding (*Aedes argenteus*) was found to be taking place in four vessels of water in which a meat safe was standing in the Hotel Victoria. Pupal and larval cases were found in one instance in the tray beneath a drip safe.

Water holes.—Several water holes were investigated in the bed of the Mehi, and larvæ of *Culex annulirostris* and *Anopheles annulipes* obtained. No evidence of *Aedes argenteus* was found.

A water hole behind the power house which collected overflow water from the bore was found to be so mixed with oil that no larvæ could be expected to breed in it.

In addition to the bore supplying the water to the town there is the bore which supplies the water for the Bore Baths. This is discharged into a channel on the south and east of the town, and eventually into the Mehi. The banks of this channel are in many places trampled and hoof marks filled with water are present. No mosquito breeding was found either in the main channel or in the hoof marks, probably on account of the water being highly mineralised.

Adult Mosquitoes.—Both *Culex fatigans* and *Aedes argenteus* were taken in rooms in the town, but neither in great numbers, probably the number of dry tanks has lessened the breeding.

Preventive Measures.—The Town Clerk was interviewed both before and after my inspection of breeding holes and a plan of campaign outlined. Ordinance 41 has been proclaimed in Moree Municipality and the provisions of the ordinance are to be put in force and householders compelled to rid their places of mosquito breeding. As a first step, a house to house visitation is to be instituted and all tanks which are not properly protected by wire gauze are to be treated on the spot with kerosene. The owners or occupiers are also to be required to adequately protect their tanks.

Horse troughs and other collections of water are to be attended to and rubbish removed. By these measures it is hoped to limit the outbreak.

C. Bourke.

Bourke is a town of 1,442 inhabitants, situated on the east bank of the Barwon or Darling River. The country is flat and mostly thinly treed with coolabah; beyond the river gidgee (*Acacia cambagei*) and other western trees occur. Immediately around the back of the town is an open plan crossed by the railway and subject to inundation when the river is in flood. On the west side the town comes down practically to the river bank which is steep; the far bank is lower and beyond is a well grassed flood plain with red gum, &c. The stream is fairly deep and moderately rapid and filled the channel from bank to bank; a weir has been thrown across some three miles below the town.

Mosquitoes at Bourke.—Four species of mosquito were identified at Bourke :—

Aedes (*Stegomyia*) *argenteus* Poiret (*Aedes ægypti L. teste* American authors)—*Stegomyia fasciata.*
Aedes (*Ochlerotatus*) *theobaldi* Taylor.
Aedes (*Ochlerotatus*) *sagax* Skuse.
Culex fatigans Wied (*Culex quinquefasciatus* say, *teste* American authors).

Adults of *Stegomyia* were found at the Central Australian Hotel, at Fitzgerald's Hotel and at the local hospital.

Culex fatigans was abundant everywhere, especially at the hospital.

The other two species are bush mosquitoes and of no significance.

Breeding Grounds.—Bourke has a municipal water supply which is pumped up from the river into a high tank and thence distributed throughout the reticulations. The water is turbid and except among the poor classes is not used for drinking purposes. Rainwater tanks are used at the hotels and better class houses for collecting drinking water. These tanks are of the usual cylindrical galvanised-iron type with perforated cover. In no case was the tank rendered mosquito proof by wire meshing. While no larvæ were actually seen in a tank, *Stegomyia* larvæ were present in the water jug on the table at the Central Australian Hotel, and this water was derived from a rainwater tank.

Breeding was proceeding in the dishes above and below a dripwater tank at Fitzgerald's Hotel, the larvæ being mainly *Stegomyia.* Other places where *Stegomyia* was breeding were the ant pots at foot of a meat safe in the yard at the Central Australian Hotel and in the fire buckets at the station. *Culex fatigans* was found breeding in the sullage water pit at the hospital, in two horse troughs, in a water bag at the hospital, in the fire buckets at the station, in the ant pots at the Central Australian Hotel, in an empty bucket in a disused privy, and in open tanks at Kessey's Hotel. It is certain that a more exhaustive search would have revealed many more breeding places, but sufficient were found to demonstrate that the conditions for the breeding of *Stegomyia* were present and that such breeding was actually taking place.

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6. INVESTIGATIONS INTO ONCHOCERCIASIS IN NEW SOUTH WALES.

Introduction.

I. Summary of Experimental Work carried out by Special Committee appointed by the Commonwealth Advisory Council of Science and Industry (Dr. E. W. Ferguson).

II. Final Report of the Special Committee (prepared by Miss M. Henry, B.Sc.).

III. Surveys of Cattle in Various Districts in New South Wales, 1917–20, for detection of Worm Nodules (Professor J. B. Cleland and Miss Bessie M. Somerville, B.Sc.).

Under this heading are brought together two important contributions to the experimental work on this subject in New South Wales. Between the years 1917 and 1920, experiments were carried out on the transmission of *Onchocerca gibsoni* by a special committee appointed by the Commonwealth Advisory Council of Science and Industry. The results of this work have never been published, though a series of fourteen progress reports and a final report were made by the Committee. This final report was prepared by the officer carrying out the experiments (Miss M. Henry). The publication of this report appears highly desirable, and was undertaken at the request of the then Acting Director of the Institute of Science and Industry. It is fitting that the report should appear in this series of publications, inasmuch as Dr. (now Professor) J. B. Cleland, at that time Principal Microbiologist of this department, was directly connected with the work which was carried out at Kendall and elsewhere in New South Wales. To this report is affixed a short review of the investigations taken from the Progress Reports and the Final Report, made by myself some months ago. The Progress Reports and Final Report were submitted to me by the Institute of Science and Industry for the purpose of determining whether these reports should be published. As the progress reports consist in large measure of records of species of *Tabanidæ* caught and dissected, all of which have been summarised by Miss Henry, it has not been thought necessary to publish these Progress Reports in detail.

The second investigation on *Onchocerciasis* comprises a series of surveys of cattle in various districts in New South Wales carried out by Dr. Cleland and Miss Somerville during the years 1917-20. The results of this survey were published in Science and Industry, Vol. 1, part 3, pp. 179–182, 1919. The results herein republished include not only the tables but the detailed examinations of the dairy herds which were not included in the previous publication, while the preliminary notes are omitted.

I. Investigations into Onchocerciasis at Kendall, New South Wales.

In 1917 a committee was appointed by the Commonwealth Advisory Council of Science and Industry to inquire into life history of *Onchocerca gibsoni*, in particular as to the mode of transmission of the parasite. The Committee consisted of the late Professor S. J. Johnston, Professor J. Burton Cleland and Professor J. D. Stewart. A series of fourteen progress reports was made by this Committee at intervals from March, 1917, to July, 1920, and a special report was presented on the termination of the Committee's activities.

It is here proposed to review the work carried out at Kendall and the results obtained as disclosed in the progress reports and in the final report which was prepared for the Committee by Miss Henry. Miss Henry, B.Sc., was engaged by the Committee to act as Assistant Zoologist and devoted her whole time to the work both at Kendall and in the winter months at Sydney University.

Selection of Site for Operations.—Kendall in the Camden Haven District was selected as a site for the experimental work. The selection of this locality was based on the prevalence of both worm nodules and of Tabanidae in the district.

A table is given by Miss Henry showing the result of inspection of the local dairy herds for the presence of worm nodules. The average infestation found at the first inspection is given as 75 per cent. for the dairy herds in and close to Kendall and somewhat less higher up the river. It would thus appear that the site selected was most suitable for the investigation.

A list of the Tabanidæ (March) flies found in the district has already been published by Ferguson and Henry (Proc. Linn. Soc. New South Wales, XLIV, 4, Nov., 1919, pp. 830–3). In this table is also given the seasonal distribution of the Tabanidæ captured. The list requires revision in view of alterations in nomenclature, the main alteration being that the generic names *Erephopsis* and *Diatomineura* are sunk as synonyms of *Scaptia.* Several specific names have also been altered and the necessary changes to conform with the new nomenclature have been made in the lists of species and in the text of Miss Henry's report.

In all thirty-eight named and three undetermined species are recorded from the district. It should be noted that the range of none of the species collected is coextensive with the known distribution of Onchocerciasis in Australia.

Records of the species of mosquitoes found in the district, of other blood sucking species of flies, and the results of dissections thereof are given in Miss Henry's report.

The fresh water Crustacea were largely collected and form the basis of several papers by Miss Henry giving the distribution of known forms and describing new species.

The main work carried out at the investigational station may be summarised under two headings—(*a*) Experiments with calves; (*b*) Dissections of Tabanidæ.

(*a*) *Experiments with Calves.*—These are discussed by Miss Henry under three headings:—

1. The examination of calves born at Kendall and transhipped to Sydney.
2. The attempt to infect calves confined in a fly proof pen into which Tabanidæ were liberated.
3. Control calves confined in open pens alongside the closed pens.

Two calves were used in the first experiment, born in April, 1917; they were kept at Kendall until October, 1917, and then brought to Sydney. These calves were killed in June, 1918, but no nodules found.

In the second experiment two lots of calves were used.

In January, 1918, two Tasmanian calves were brought up and conveyed to the fly proof pen where they remained until August and September, one being killed in each of these months. During the time they were in the cages fifty Tabanidæ fed on worm nodules and seventy-four which had not been fed were liberated in the pen.

The second lot of calves comprised two calves born at Kendall and placed in the cage soon after birth. These calves were put into the cage in November, 1919, and were kept there until May, 1920, when as they showed no evidence of infection they were turned out into the paddock. During this period 2,068 flies belonging to seventeen species were liberated in the calf pen.

The third experiment was in the nature of a control to the feeding experiments. It was expected that the calves in the control pen would be infected if the vector was a flying insect and present in the neighbourhood. The value of the control was largely nullified by their failure to become infected.

Review of Results of Calf Experiments.—The negative results of all the calf experiments unfortunately do not advance the inquiry. The failure to find worm nodules in calves kept at Kendall during the winter and then removed to Sydney might be held to indicate that infection does not take place during the winter months. On the other hand the failure of the control calves which were kept in the open pen to become infected does not justify this conclusion. These calves were kept in each case over one summer, in the first instance from January, 1918, to August and September, 1918, and in the second case from November, 1919, to May, 1920. Miss Henry notes that calves born at the same time as those used in the second control but running with the herds did not become infected, which suggests that the season had not been a favourable one for fresh infection even under natural conditions.

Under these circumstances it is not surprising that the experimental calves in the fly-proof pen did not become infected. In addition there were the difficulties experienced in inducing flies liberated in the cage to "bite" the calves. These difficulties have been fully elaborated by Miss Henry and need not be reconsidered here.

If feeding experiments with calves are to be continued, it will be necessary to devise less artificial conditions than pertained in the cage used at Kendall.

Reference might be made here to the infection that occurred in the two calves that were kept at Rabbit Island in the Hawkesbury River. It does not appear from the reports when these calves were first placed on the Island but they were finally killed in July and August, 1919, respectively. The discovery in one of *O. gutterosa* and in the other of *O. gibsoni*, would appear to exclude all but a flying insect as the vector of *Onchocerciasis* since these calves were completely isolated from other cattle and were protected from other modes of infection.

Dissections.—According to Miss Henry's report a total of 12,684 flies were dissected and microfilariæ found in two species—about a dozen times in *Tabanus circumdatus* and twice in *T. innotatus.* The latter species is possibly only a melanistic form of *T. circumdatus.*

The argument in favour of regarding *T. circumdatus* as a vector of *Onchocerciasis* centres around the identity of these microfilariæ. Professor T. H. Johnston and Miss Bancroft encountered similar larvae in Tabanidæ in Queensland and described them under the name of *Agamofilaria tabanicola.* These authors were of the opinion that the larvæ were not the immature stage of *Onchocerca gibsoni*, but probably of a species of Filaria occurring in some native animal.

No experiments appear to have been made to infect cattle by the injection of preparations containing living larvæ.

Other experimental Work.—In addition to the main investigations, several other lines of work were carried out and are detailed by Miss Henry in her report. These may be very briefly summarised here.

Dissection of Mosquitoes.—Six species are recorded as occurring at Kendall and "several hundred" are stated to have been dissected with negative results.

Stomoxys calcitrans.—Fifty caught on cattle were dissected—result negative.

Non Blood-sucking Flies.—Three species found around cattle—*Musca domestica, M. vetustissima* and *Hydrotea australis,* were fed on worm nodules and dissected without result.

Crustacea.—In addition to the collection and identification of species many thousands were examined microscopically without finding larval filariæ.

Experiments to infect crustacæ by adding worm nodules to water resulted in finding one motionless larvæ in the alimentary track of a crustacean (*Cyclops australis*).

Attempts to infect Tabanidæ by feeding.—Motionless and apparently dead larvæ were found in the alimentary tract of *Tabanidæ* that had been induced to feed on fruit on which water containing larvæ had been placed. It is probable that these were merely ingested with the fruit juices on feeding, and there is no evidence that the larvæ thus ingested would further develop in the flies.

Examination of Soil.—The examination of soil from the sleeping places of cattle yielded negative results.

General Review.—With the exception of the finding of filarial larvæ in *Tabanus circumdatus* and *T. innotatus* the investigations at Kendall must be regarded as inconclusive either as incriminating or as disproving *Tabanidæ* as a vector of *Onchocerciasis*. The calf experiments are particularly inconclusive especially in view of the apparent absence of the conditions necessary to secure fresh infestation in the local cattle. Apart from this the cage experiments are unsatisfactory as, though large numbers of Tabanidæ were liberated, it is probable that very few, if any, actually fed on the calves.

As regards other experimental work that on Crustacea appears to be the most complete and exhaustive and the negative results obtained from the microscopic examination of "many thousands" of specimens almost justify the conclusion that this group is not concerned in the transmission of the disease.

II.—REPORT OF THE SPECIAL COMMITTEE FOR THE INVESTIGATION OF WORM NODULES IN CATTLE, PREPARED BY MISS HENRY.

Introduction.

In January, 1917, the Special Committee appointed by the Commonwealth Advisory Council of Science and Industry commenced investigations into the life history of *Onchocerca gibsoni*, the cause of worm nodules in cattle.

The locality selected for the establishment of an experimental station was the Camden Haven district on the north coast of New South Wales, with headquarters at Kendall. Kendall is situated on the Camden Haven river, along the valley of which are rich flats devoted to dairying, with stretches of uncleared bush. The river enters the sea at Laurieton 7 miles from Kendall; 2 miles away on the other side of the river is the smaller village of Kew.

This district was specially chosen for these experiments, since the cattle are as heavily infested with worm nodules as in any part of the State. The most suspected vector, the March fly, is present in large numbers during the summer months, and can be easily caught close to the village. Several freshwater creeks are situated near by, and these are teeming with small crustacea which are a possible vector. Some of the dairies are actually in the village, while others are not far distant. These factors showed that the district was admirably suited for experimental purposes.

Infestation of Cattle.

The first inspection of the dairy herds in and close to Kendall showed an average infestation of 75 per cent. At the farms higher up the river the infestation was somewhat less. Besides the dairy cattle, two teams of working bullocks were examined and found to be heavily infested.

The following list shows the result of the first inspection :—

Owners of Herd.	Locality.	Cow.													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wallace	Kew	2	3	3	3	1	6	3	3	...	...	...	...	...	...
Usher	Kendall	1	2	...	5	1	...	1	...	...	...	...	...	...	...
Baker	Heron's Creek	2	3	...	3	1	1	...	...	...	...	...	...	...	...
Upsell	Lorne	5	1	1	1	1	4	2	4	3	3	...	...	...	...
Corrigan	Black Creek	...	...	...	2	...	1	...	5	1	2	...	...	...	...
Wallace	Lorne	1	...	2	1	...	2	...	...	...	...	...	...	...	...
Capewell	Kendall	1	2	1	1	...	...	...	...	...	...	...	...	...	...
Tenie	Kew	...	2	1	...	...	...	...	...	...	...	...	...	...	...
Ireland	Kew	...	6	1	...	...	...	...	...	...	...	...	...	...	...
Corrigan	Logan's Crossing	1	1	1	...	1	4	4	...	2	2	...	1	2	3
Bueton	Lorne	1	1	1	1	...	...	...	...	...	...	...	...	...	...
Smith	Fox's Creek	1	...	...	2	1	1	...	...	...	...	...	...	...	...
Breckenridge	Kendall	1	...	3	...	2	...	1	...	1	...	1	2	2	...
Stuee	Kew	1	...	...	2	...	1	...	...	...	...	...	...	...	...
Waddell	Kew	1	...	3	2	...	1	...	3	4	1	...	1	1	...
Withers	Lorne	1	...	4	...	...	4	3	...	...	...	1	...	...	2
Lightly	Kendall	...	1	...	2	1	...	...	...	...	...	...	...	...	...

Result of possible means of infestation as applied to the Kendall District.

I. *By a blood-sucking intermediate host.*—(*a*) *Tabanids.*—These are very prevalent throughout this district; members of forty-one different species have been collected. These include seventeen species of the genus *Scaptia* (previously recorded under the genera *Erephopsis* and *Diatomineura*), of which two were new and one undetermined; two of *Caenoprosopon*, one being new; three *Silvius*, one new; and nineteen *Tabanus*, of which six were described as new and two not identified.

Scaptia guttata Donovan.
media Walker.
limbithorax Macq. (= *niveovittata* Ferg. and Henry).
aureovestita Ferg. and Henry.
quadrimacula Walker.
lasiophthalma, Macq. (= *contigua* Walk.)
concolor Walker.
sp. nov. (= *gibbula* Ferg. and Henry, var., *nec* Walker).
auriflua Donovan.
abdominalis Ricardo.

Scaptia testacea Macquart.
fulgida Ferg. and Henry.
montana Ricardo.
subappendiculata Macq. (= *inflata* Ric.).
brevirostris Macquart.
elavata Macquart.
aurata Macq. (= *crassa* Walk).

Caenoprosopon wainwright Ricardo.
nigrovittatus Ferg. and Hill (= *Demoplatus nigrovittatus*).

Silvius luridus Walker.
paraluridus Ferg. and Henry.
fergusoni Ricardo.
Tabanus vespiformis Ferg. and Henry.
parvicallosus Ricardo.
trilinealis Ferg. and Henry.
victoriensis Ricardo.
alternatus Ferg. and Hill (= *macquarti* Ric.).
rivularis Ferg. and Hill (= *pygmaeus* Ferg. and Henry).
kewensis Ferg. and Henry.
cyaneus Wied.
Tabanus sanguinarius Bigot.
davidsoni Taylor.
ochreoflavus Ferg. and Henry.
circumdatus Walker (including specimens previously identified as *edentulus* Macq.)
sp. near *imperfectus* Walker (No. 11).
sp. near *circumdatus* Walk. (No. 26).
innotatus Ferg. and Henry.
regis-georgii Macquart.
postponens Walker.
oculatus Ric. (= *kendallensis* Taylor).
neobasalis Taylor.

The new species, with the exception of *Demoplatus nigrovittatus* were described in a paper entitled "*Tabanidæ* from the Camden Haven district, with Descriptions of New Species." This also contains notes on the habits and seasonal distribution of all the species, and a table showing the number of the different species collected during 1917, 1918, and January to March, 1919.

The following table gives the number for November to December, 1919, and January to March, 1920:—

TABLE collected from November, 1919, to March, 1920.

Species.	Ref. No.	Nov. 3–9.	Nov. 10–16.	Nov. 17–23.	Nov. 24–30.	Dec. 1–7.	Dec. 8–14.	Dec. 15–21.	Dec. 22–28.	Dec. 29–Jan. 4.	Jan. 5–12.	Jan. 13–20.	Jan. 21–28.	Jan. 29 Feb. 5.	Feb. 6–13.	Feb. 14–21.	Feb. 22–29.	Mar. 1–8.	Mar. 9–16.	Mar. 17–19.
T. parvicallosus	1	6	...	3	40	34	22	15	...	...	...	...	...	3	15	42	26	22	1	...
S. guttata	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	28	33	25	1	...
T. oculatus	3	1	1	5	...	...	4	...	...	...	...	...	...	...	4	29	28	321	88	1
T. ochreoflavus	5	...	...	...	3	14	4	2	...	...	...	...	...	2	3	12	12	3	1	...
T. postponens	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...
T. regis-georgii	7	1	...	3	...	35	5	5	...	...	...	...	...	...	...	1	2	...	...	...
S. luridus	8	...	...	2	8	22	70	...	No collecting.	No collecting.	Very wet.	Very wet.	Dull and showery.	...	5	6	3	3	5	...
T. sanguinarius	10	...	...	3	95	76	20	...						1	2	77	97	48	...	...
S. abdominalis	13	...	...	...	...	...	...							...	...	1	1	...	...	...
S. concolor	14	...	...	...	...	...	...	...						...	2	42	18	16	1	...
T. rivularis	15	...	...	...	...	...	...	...						...	...	...	...	1	...	...
S. paraluridus	17	...	...	1	1	9	2	7						3	....	2	2	8	...	...
T. alternatus	19	...	...	...	1	1	2	1						8	3	155	97	73	17	...
T. innotatus	21	...	...	...	...	1	...	...	...	...	...	...		...	...	1	1	5	...	...
T. circumdatus	23	4	...	...	...	3	15	...	...	...	...	...	...	4	14	69	122	93	35	3
	35	...	...	...	...	...	1	...	...	...	...	...	...	1	9	77	322	446	79	17
S. subappendiculata	24	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15	41	309	54	...
T. neo basalis	25	1	...	...	...	...	3	...	...	...	...	...	...	...	...	...	1	...	...	...
T sp. (?)	26	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13	3	1	2
T. cyaneus	27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	1	...	...	...
S. clavata	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...
T. davidsoni	32	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
T. victoriensis	33	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	4	3	...	...
T. trilinealis	37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	2	1	...
S. auriflua	45	1	...	...	3	...	...	...	...	...	...	...	...	...	...	...	4	8	...	...
S. testacea	49	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	10	...	...	...
Cœnoprosopon nigrovittatus	51	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1

* The names given by Miss Henry in her report have been altered to correspond with more recent usage.

(*b*) Mosquitoes were also very numerous and attacked the cows in large numbers. The following specimens were collected.

Anopheles annulipes (Walk.).
Aedes (*Finlaya*) *alboannulata* (Macq.).
Aedes (*Finlaya*) *notoscripta* (Skuse).
Aedes (*Ochlerotatus*) *vigilax* (Skuse).
Culex fatigans Wied.
Culex annulirostris Skuse.

Several hundred mosquitoes caught round the dairies were examined microscopically in the summer and autumn of 1917, but no Onchocerca larvæ were found.

(*c*) *Stomoxys calcitrans* were frequently seen biting the cows and around the dairies. In view of the results of the experiments of Cleland, Dodd and Ferguson more attention was given to Tabanids than to Stomoxys. About fifty specimens actually caught on the cattle were dissected.

(*d*) *Spaniopsis longicornis* Ferg. rarely collected in the district.

(*e*) *Culicoides* Sandflies were abundant at Laurieton and by the sea, but were very seldom seen in the vicinity of Kendall.

(*f*) *Lice* were not very prevalent, but were occasionally found when the cows were not in good condition; they were more numerous in the winter months. About a hundred obtained from Corrigan's farm were teased and examined.

(*g*) *Ticks* of several different species were frequently found on the cows. The absence of ticks on Milson Island render them an improbable vector.

(*h*) *Leeches.*—No leeches were found on the cows, though they are plentiful in the brush near Kendall.

(2) *By a non-biting blood or lymph-absorbing fly.*—The non-biting flies observed round the cows and dairies are *Musca domestica*, *Musca vetustissima* and a much smaller fly, member of the family Anthomyidæ *Hydrotea australis*. *Musca domestica* is sometimes present on the cows, crawling on their eyes and noses, *M. vetustissima* is more frequently present. The smaller flies were very plentiful crawling over the cows and clustering round the biting Tabanids to obtain a share in the blood sucked up.

Members of these three species were fed on nodules and some of those caught on the cows were dissected. All experiments with them gave a negative result.

(3) *By a possible water dwelling invertebrate host.*—The creeks near Kendall contain a very great number of small crustaceans belonging to the classes Cladocera, Ostracoda and Copepoda. The following species were collected.

Claocera.
Scapholeberis kingi Sars.
Simocephalus australiensis Dana.
Ilyocryptus longiremus Sars.
Acroperus avirostris Henry.
,, *sinuatus* Henry.
Alona whiteleggii Sars.
,, *wallaciana* Henry.
,, *kendallensis* Henry.
Alonella ilathratula Sars.
Chydorus cielandi Henry.

Copepoda.
Boeckella minuta Sars.
Gladioferens spinosus Henry.
Cyclops australis King.
Mesocyclops obsoletus Koch.
Pachycyclops annulicornis Koch.
Leptocyclops agilis Koch.
,, *viridis* Henry.
Platycyclops phaleratus Koch.
,, *fimbriatus* Fischer.

Ostracoda.
Cypretta globulus Sars.
Ilyodromus varrovillius King.

The five new Cladoceran species have been described in a paper " On some Australian Cladocera " This also contains descriptions of new species collected in other localities, mainly those visited for data on the relative distribution of worm nodules. The Copepoda and Ostracoda have been similarly dealt within a paper on " Some Australian Freshwater Copepoda and Ostracoda."

Many thousands of these were examined microscopically but no *Onchocerca* larvæ were found. Crustacea from the catchment area of the water supply of Milson and Rabbit Island were also examined.

Experiments to infect Crustacea with Onchocerca larvæ.—Some of these expirements were carried on at Kendall, and in this case, the crustacea were collected from the neighbouring freshwater creeks and the nodules obtained from the local butcher.

In the case of experiments carried on at Sydney, some of the crustacea were brought from Kendall while others were collected from the Hawkesbury River, Waterfall, and from a pond in the University grounds, the worm nodules were obtained from the Homebush Abattoirs. The crustacea were placed in a small crystal dish of water to which hundreds of larvæ were added. Some of the crustacea were examined twenty-four hours after the larvæ had been put with them and others a few hours later. This experiment was tried many times but on only one occasion was a larva found to have been ingested, it was squeezed out of the alimentary canal of a *Cyclops australis* with other food matter and was non-motile.

(4) *By direct infection per skin from contact with soil.*—The likelihood of an earth-borne infection does not seem to be great as the larvæ appear unfitted for a free existence.

In view of the possibility of such a source of infection, some experiments were carried out in the autumn of 1917. The cows sleeping places were carefully noted and in the morning, the surface layers of soil and grass were removed to the laboratory, placed in water and examined. Numerous nematode worms were found but no *Onchocerca*.

Examination of Tabanidæ.

(1) *Methods of dissection with details of structure.*—Dissections of *Tabanidæ* are made in dissecting dishes half filled with black paraffin wax. The fly is fastened to the wax by means of pins, with its ventral surface directed downwards and is just covered with water. The mouth parts are first removed, separated from each other and mounted in a drop of water on a slide. The first step in a dissection of the trunk is to make a slit from the anus to the end of the thorax on the dorsal surface; the flaps are then pulled aside and pinned down this reveals the alimentary canal. The œsophagus is cut away from the top of the thorax and the rectum from the base of the abdomen; the entire alimentary canal can then be removed, placed in a drop of water on a slide and examined under the microscope. The salivary glands are then lifted out, mounted and examined in the same way. The first portion of the alimentary canal is a narrow, short œsophagus; a similar but much longer structure enters the proventriculus at the same point as the œsohpagus, this is the duct of the crop. The crop itself is a bi-lobed sac with very thin walls, sometimes it is dilated and contains air and yellowish-coloured fluid which, on being tested with Fehlings solution gave the characteristic sugar reaction.

Pollen grains have also been found in the crop and some of these were identified as those of *Eucalyptus corymbosa*; no blood was ever seen in the crop, even in flies dissected immediately after feeding. The proventriculus has two broad lateral expansions at the anterior end, the œsophagus and duct of the crop open between them, posteriorly it narrows to a uniform-sized tube; the surface is throughout covered with rounded elevations.

The mid-gut is somewhat pear shaped and may be very greatly distended with blood; at the junction of the mid and hind-gut are four long malphighian tubes. The hind-gut consists of two portions an anterior ileum and a posterior wider colon. The rectum has a rounded form and bears six rectal glands or papillæ.

The salivary glands are long and tubular and lie slightly below and to each side of the proventriculus for the greater part of their length; their relative length differs somewhat in the different species.

(2) *Results of Dissections.*—Altogether 12,684 flies were dissected, all of which were females. In the dissection of several different species a parasite was found in the lower part of the alimentary canal. This appeared to be the larval form of a chalcid wasp, and was found at various stages of its development. Sometimes it occurred free in the body cavity and in such cases there was always a perforation in the wall

of the alimentary canal. Microfilariæ were found in dissections of *Tabanus circumdatus* and *Tabanus innotatus*; about a dozen times in the former and in two specimens of the latter. They were found in the crop, proventriculus, stomach, and entangled in the fat bodies. They also occurred in the mouth parts, particularly the tube made by the juxtaposition of the labrum and the hypopharynx. The structure of these corresponds very closely with those described by Professor T. Harvey Johnston and Miss M. J. Bancroft in their paper entitled "Experiments with certain Diptera as possible Transmitters of Bovine Onchocerciasis," and called by them *Agamofilaria tabanicola* larvæ measuring from 1·93 to 24 mm. have a maximum width of 35 to 40 and the anus is situated about 40 from the top of the tail. The youngest larvæ measure 150 to 260 in length with a maximum width of 21 to 30 and the anus 25 from the top of the tail. A typical larva found in the alimentary canal of *T. innotatus* measured 1·51 mm. in length, the maximum width was 28·2 and the anus was 25·8 from the top of the pointed posterior end. Johnston and Bancroft state that "it is almost certain that these microfilariæ do not represent the intermediate stage of *Onchocera gibsoni*." The reasons given are the smoothness of the cuticle and the large numbers found in a single fly. The surface of the cuticle however, is not absolutely smooth but possesses markings which are visible under a high power of the microscope. The filaria larvæ are not distinctive enough for it to be definitely stated to which species they belong.

Table of Dissections.

Species.	Ref. No.	1917.	1918.	1919.	1920.
T. parvicallosus	1	214	658	244	108
S. guttata	2	156	84	63	84
T. oculatus	3	140	268	459	282
S. fergusoni	4	9	47	5	....
T. ochreoflavus	5	76	115	158	31
T. postponens	6	3	1	....	....
T. regis-georgii	7	124	208	134	2
S. luridus	8	290	31	110	14
T. sanguinarius	10	96	505	411	203
T. sp ?	11	10	5	....	....
S. abdominalis	13	4	19	....	....
S. concolor	14	52	207	89	55
T. rivularis	15	9	....	....	....
S. paraluridus	17	370	303	41	10
T. alternatus	19	18	174	192	348
T. innotatus	21	9	102	20	5
T. circumdatus	22	94	109	6	....
,,	23	230	971	1,277	335
S. subappendiculata	24	35	188	516	409
T. neobasalis	25	2	6	4	....
T. sp ?	26	2	24	....	9
T. cyaneus	27	....	3	....	....
S. clavata	29	3	5	10	1
T. davidsoni	32	....	9	3	....
T. victoriensis	33	....	12	24	5
T. edentulus	35	....	....	1	924
T. trilinealis	37	....	1	....	1
T. kewensis	38	....	10	....	....
S. quadrimacula	43	....	27	....	....
S. fulgida	44	....	1	1	....
S. auriflua	45	3	18	11	....
S. aureovestita	46	....	1	....	....
S. asiophthalma	47	....	....	....	....
S. aurata	....	....	2	10	....

Tabanids in Captivity.

The March flies were kept in cages made out of kerosene tins; three sides of the tin were cut out, leaving a framework with top, bottom and one side; a covering of mosquito net fitted closely round this framework with an opening at one side large enough to admit a hand and arm. The flies were best kept alive when the cages were placed on a verandah and sheltered from the hot afternoon sun. Their food consisted of fresh fruit, the juice of which they readily sucked up, or sugar and water. If the weather was not too hot flies could be kept alive in these cages for as long as three weeks.

Attempts at artificially infecting Tabanids with Onchocerca larvæ.

The nodules were bisected and a smear made of the juice which contains the larvæ to examine their condition. In the case of their being non-motile they were placed in warm water, if the larvæ are alive, this restores their vitality and in a short time they begin to move actively. Nodule juice containing motile larvæ was placed on freshly cut fruit. The bisected nodule was also placed in the cage, but the flies did not feed from these nearly as readily as from the fruit. Flies fed in this way were dissected as soon as they died, or if they were all alive the first dissection was made the following day and each succeeding day. Larval worms were found in the crop, proventiculus and stomach, but in no case were they motile. They were found in *Tabanus circumdatus, S. luridus, T. parvicallosus, T. sanguinarius* and *Seaptia guttata*. This method is at best very artificial since many of the larvæ are not in the right stage to develop in an intermediate host, having been liberated from the cut uterus of the female.

Tabanid life Histories.

The eggs of Tabanids were found on various plants growing along the banks and in the creeks; they were most frequently found on *Sparganimum augusta folium and Scirpus sp.* Some of the eggs so collected were hatched out, but the larvæ only survived one or two days. The small creeks and waterholes were dredged for aquatic larvæ, and the mud of the banks dug up and examined.

A few larvæ were obtained in this way, but none of them reached maturity. A search was also made for non-aquatic larvæ; loose soil dug up near the bases of large forest trees and in the hollows at the bases was carefully sifted, since Tabanid larvæ have been found in such situations; none, however, were obtained in this way at Kendall.

The distribution of Worm Nodules in Cattle in New South Wales.

During the summer of 1917-18 a survey was made to ascertain the relative prevalence of worm nodules in different parts of the State. This was undertaken since it seemed probable that such information would give evidence as to the transmittor from one vertebrate host to another. The survey was carried out by Dr. J. B. Cleland and Miss B. M. Somerville. Their report, accompanied by a map was published in Science and Industry, and entitled "The Distribution in New South Wales of Worm Nodules in Cattle due to *Onchocerca gibsoni*."

Brisbane Investigations.

In the summer of 1918-19 an attempt was made at Brisbane to trace out the development of the larval *Onchocerca* in *Tabanus circumdatus* or any other Tabanid in which it might be capable of living. The artificial feeding of flies at Kendall had been very much hampered by the difficulty of obtaining fresh worm nodules and a plentiful supply of these was assured at Brisbane.

Unfortunately the season was a bad one for Tabanids and other insects needing water for their development, as there had been practically no rain for nine months. The bush, especially near swamps and lagoons which were mostly dried up, was thoroughly searched for Tabanids at Goodna, Darra, Pinkenba, Sandgate, Dutton Park, Rocklea, Birkdale, Wellington Point, Mount Cootha, and Mount Gravatt. A few Tabanids were caught at Sandgate. These were all of the same species *Tabanus rufinotatus* which does not occur at Kendall. Since the supply of nodules was excellent these flies were persistently fed with worm larvæ, but none were found in the subsequent dissections.

I. *Experiments with Calves.*

Two calves born at Kendall in April, 1917, after Tabanidæ had disappeared, were kept there until October and then sent to Sydney, where they were kept in the premises of the Zoological Department of the University, where Tabanids could not find access to them. If nodules had developed in these calves, it would have proved that the vector was not a Tabanid. The calves were killed in June, 1918, and a careful search made for worm nodules, but none were present.

II. *Attempt to infect Tasmanian calves by exposure to the bites of Tabanids.*

A fly-proof pen was erected at Kendall from material that formed two pens on Milson Island in the Hawkesbury River which had been used for feeding experiments with calves. Two calves that had been purchased in Tasmania were placed in this pen on January 22nd, 1918. Special precautions were taken to prevent them being attacked by insects during their transference from Laurieton, where they left the ship, to the fly-proof pen. The drinking water of these calves was boiled and they were fed on lucerne hay from Sydney. The pen had a cement floor so that all possible sources of infection were cut off. Flies which had been fed with larvæ from worm nodules were set free in this cage, and as the nodule supply was limited, a number of unfed flies caught at the various dairies were also liberated in the cage.

The following numbers of each species were liberated :—

Species.	Reference No.	Fed Flies.	Unfed Flies.
T. parvicallosus	1	17	20
T. oculatus	3	3	20
T. ochreoflavus	5	2	......
S. paraluridus	18	7	......
T. alternatus	19	2	1
T. innotatus	21	4	1
T. circumdatus	22	14	17
S. subappendiculata	24	......	13
S. clavata	29	......	2
T. victoriensis	23	1	......

One of these calves was killed on 5th August and examined for nodules. None were present. The remaining calf died early in September, and again no nodules were found at the post mortem examination. This experiment was repeated the following season with two calves born at Kew and placed in the pens very soon after birth. The following flies were liberated in the cage.

Species.	Ref. No.	Number liberated.
T. parvicallosus	1	49
S. guttata	2	38
T. oculatus	3	30
T. ochreoflavus	5	120
T. regis-georgis	7	63
S. luridus	8	174
T. sanguinarius	10	900
S. auriflua	12	40
S. concolor	14	17
S. paraluridus	18	53
T. alternatus	19	1
T. innotatus	21	2
T. circumdatus	22	236
S. subappendiculata	24	2
S. abdominalis	31	91
S. quadrimacula	43	178
S. fulgida	44	44

The results of this experiment were again negative.

The negative results of these experiments do not prove that a Tabanid is not the vector of *Onchocerca gibsoni* since comparatively few of the flies introduced into the cage, actually bit the calves. The conditions were apparently too artificial for the life of these insects; they seldom survived more than two days in the cage, although all possible precautions were taken. It was found that on being liberated in the cage the flies were apt to fly madly about and damage their wings and legs; to prevent this, mosquito netting was stretched inside the wire, also green leafy boughs were kept in the cage, and a bowl of plants growing in water. The calves, too, easily flicked off the flies that settled on them, so their tails were cut short and patches on their backs and legs were shaved to make it easier for the flies to bite. An attempt was made to induce the flies to bite by placing them in a lamp glass, one end of which was covered with gauze and the other placed over the shaven area of skin, but no really good bites were obtained in this way. Another difficulty is the fact that blood is not necessary for the mere existence of the Tabanid, it is not known how many feeds of blood a fly takes during its life, it is possible that it only requires blood for the maturation of its ovaries.

III. *Experiment with a Calf in a pen exposed to Flying Insects.*

Two Tasmanian calves bought at the same time as those used in experiment II, were brought with them to Kendall and placed in an open pen built on a raised cement platform with sloping sides. These were fed and watered in the same way as in the last experiment so that nothing could have access to the calf except winged insects. Tabanids, *Stomoxys calcitrans*, mosquitoes and *Musca vetustissima* were frequently observed in the vicinity of this pen and sometimes on the calves themselves. One calf was killed in August, 1918, and the other at the end of September, but no nodules were found. This experiment was repeated the following season with locally bred calves and again without positive results being obtained. In connection with this experiment a number of calves, born about the same time as the calves in the experimental pen, but running free with the herd, were examined for nodules, and found to be also uninfected. This points to the fact that the season had not been a favourable one for fresh infection, even under natural conditions.

Experiment with two Tasmanian Calves isolated on Rabbit Island.

Two more Tasmanian calves were taken to Rabbit Island in the Hawkesbury River and kept in a yard there. Rabbit Island has never had stock on it so that the ground is not infected. On the mainland opposite to it, about 400 yards away is a herd of dairy cattle moderately infected with worm nodules. The water for these calves was either tank water caught on the island or boiled water from the water supply, so that the possibility of infection through the water was also cut off. One of the calves was killed on 12th July, 1919. One female "travelling worm" was found in the region over the femoral point. The remaining calf was killed on 30th August and a small worm nodule was found near the brisket. These worms were sent to Dr. E. W. Ferguson for identification and he reports that "the wander worm is certainly the same as the ones we get at the abattoirs probably *O. bovis*, but the small worm nodule from the other calf is apparently the true *O. gibsoni* as far as I can judge from the fragments I have been able to dissect."

Since all other means of infection have been prevented, it must have taken place through the agency of some flying insect. The fact that two different species of *Onchocerca* were found is of great importance; the larvæ of both species must have a flying insect for their intermediate host and these larvæ are probably very similar in their immature condition.

*Onchocerca bovis** *in Australian Cattle.*

The occurrence of *Onchocerca bovis* in Australian cattle has been recorded by Harvey Johnston and Bancroft. Before the publication of their paper the presence of "travelling worms" had been noted by meat inspectors in Sydney. As it seemed desirable to know something more of these travelling worms, a carcase was obtained from Homebush abattoirs and dissected. One large nodule (*O. gibsoni*) was situated on the right side, about 6 inches from the lateral ensiform cartilage.

Small degenerate nodules were found in the following situations:—

1. Inferior aspect of the ligamentum nuchæ near its dorsal insertion.
2. Left stifle.
3. Left stifle.

A degenerate worm cluster was found in the left forequarter sub-cutaneously over the shoulder joint.

A fresh female "travelling worm" was found in the ligamentum nuchæ and close to it a degenerate worm. A short portion of a third worm was also extracted from the ligamentum nuchæ. Since the presence of travelling worms appeared to be widespread, Mr. J. Drabble was appointed in January, 1920, to make an examination of the cattle slaughtered at the State Abattoirs at Homebush to ascertain their prevalence and situation.

These worms were also identified by Dr. Ferguson who states, "I have carefully compared the wander worms with specimens of *Onchocerca gibsoni* from worn nodules and can see come to no other conclusion than that they belong to a different species. In all probability they are *O. bovis* as far as one can judge of the rather meagre details of that species. The only doubt is that *O. bovis* was described from worms found near the stifle, no mention being made of the ligamentum nuchæ as the principle habitat as is the case with our Australian worms. South American specimens taken on the ligamentum nuchæ have been assigned to *O. bovis*, but it does not appear from the available literature, that South American specimens have been carefully compared with French ones. The probability is that it is all the one species.

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* Since determined by Johnson as *O. gutterosa* Newmann.

III—Surveys of Cattle in Various Districts in New South Wales of Worm Nodules (1917-1920).

District.	No. of cows examined.	No. with worm-nests.	No. locally bred with worm-nests.	No. of nests.	Percentage affected.	Nests per affected cows.
Upper North Coast.—						
Murwillumbah	49	7	7	23	14·3	3·3
Bangalow	41	2	2	5	4·9	2·5
Ballina	75	31	31	81	41	2·6
Lismore	55	13	11	32	23·6	2·4
Casino	20	3	3	3	15	1
Mallanganee	83	24	24	37+	29	1·5
	323	80	78	181+	24·7	2·2
Middle North Coast.—						
North Dorrigo	22	3	3	4	13·6	1·3
Hunter and Manning (Northern Coastal).—						
Kendall	39	30	30	71	76·9	2·3
(Western)—						
Seone	32	6	6	9	18·7	1·5
	71	36	36	80	50·7	2·2
South Coast.—(Illawarra)—						
Thirroul	26	1	1	1	·03	1
Wollongong	60	10	9	14	16·6	1·4
Berry	35	3	2 (?)	3	8·5	1
	121	14	12 (?)	18	11·09	1·2
Northern Tableland.—New England—						
Tenterfield	54	3	...	5	5·5	1·6
Glen Innes	44	1	1	1	2·2	1
Inverell	48	20	20	28	41·6	1·4
Armidale	58	8	8	9	13·8	1·1
	204	32	29	43	15·6	1·3
Central Tablelands.—						
Mudgee (and Eurenderee)	94	35	33	45	37·2	1·2
Oberon	19	...	...	...	...	...
Bathurst	35	...	...	...	...	...
Blayney	42	...	...	...	...	...
Orange	46	7	6	...	15·2	...
Cowra	15	6	...	15 (?)	4 0	2·5
	251	48	39	60	19·1	·8
Southern Tablelands.—						
Cooma	24	1	...	1	4·1	1
Queanbeyan	44	2	2	2	4·5	1
Goulburn	85	4	3	4	4·7	1
Yass	23	1	1	1	4·3	1
	176	8	6	8	3·4	1
North-Western Slope.—						
Tamworth	74	40	37	69	54	1·7
Boggabri	5	3	1 (?)	3	60	1
	79	43	38	72	54·4	1·6
Central-Western Slope.—						
Dubbo	35	11	10	12	31·4	1·1
SouthWestern Slope.—						
Temora	36	3 (5?)	2 (?)	8	8·3	2·6
Junee	31	1	...	1	3·2	1
Wagga	27	1	1	1	3·7	1
Albury	49	11	4	14	22·4	1·3
	143	16 (?)	7 (?)	24	11·1	1·5
North-Western Plains.—						
Moree	40	18	6+(?)	38	45	2·1
Narrabri	63	35	23+(?)	74	55·4	2·1
	103	53	29+(?)	112	51·4	2·1
Central-Western Plains.—						
Warren	2	1	1	5	50	5
Riverina—						
Narrandera	46	5	5 (?)	7	10·8	1·4
Leeton	42	4	3	5	9·5	1·2
Hay	30	2	...	4	6·6	2
Deniliquin	53	3	(?)	3	5·6	1
Finley	29	...	...	...	...	...
Berrigan	9	...	...	...	...	...
Corowa	28	4	...	5	14·3	1·2
Culeairn	37	2	2	2	5·7	1
	274	20	10 (?)	26	7·2	1·3

Places with no worm nests :—

Central Tablelands : Oberon, Bathurst, Blayney.
Riverina : Finley, Berrigan.

Places with under 10 per cent. of cows showing the presence of worm nests by manual palpation :

Upper North Coast : Bangalow.
South Coast, Illawarra : Thirroul, Berry.
Northern Tableland, New England : Tenterfield, Glen Innes.
Southern Tablelands : Cooma, Queanbeyan, Goulburn, Yass.
South Western Slope : Temora, Junee, Wagga.
Riverina : Leeton, Hay, Deniliquin, Culcairn.

Places with 10 to 20 per cent. infestation :—

Upper North Coast : Murwillumbah, Casino.
Middle North Coast : N. Dorrigo.
Hunter and Manning, Western : Scone.
South Coast, Illawarra : Wollongong.
Northern Tableland, New England : Armidale.
Southern Tablelands : Orange.
Riverina : Narrandera (10·8 per cent.), Corowa.

Places with 20 to 30 per cent. infestation :—

Upper North Coast : Lismore, Mallanganee (29 per cent.).
South Western Slope : Albury.

Places with 30 to 40 per cent. infestation :—

Central Tablelands : Mudgee (37·2 per cent.), Cowra (40 per cent.).
Central Western Slope : Dubbo.

Places with 40 to 50 per cent. infestation :—

Upper North Coast : Ballina.
Northern Tableland, New England : Inverell.
North Western Plains : Moree.

Places with 50 to 60 per cent. infestation :—

North Western Slope : Tamworth, Boggabri.
North Western Plains : Narrabri.

Places with 70 to 80 per cent. infestation :—

Hunter and Manning, Northern Coastal : Kendall (76·9 per cent.).

Summary.—High, cold (in winter), poorly-timbered country shows the absence of worm nests (*e.g.*, Oberon, Bathurst, Blayney), or with a small percentage of cows affected (*e.g.*, Tenterfield and Glen Innes and Southern Tablelands). The coastal district, both north and south, shows wide variations, but in general higher infestations have been found on the North Coast than on the South, whilst the highest infestation met with anywhere, namely, 76·9 per cent. was found at Kendall. It is remarkable that whilst Bangalow shows only 4·9 per cent., Ballina in the same district shows 41 per cent. In some cases the presence of heavy timber and creeks in proximity to dairies seem to favour infestation. The dry western type of country shows heavy infestation in such places as Moree, Narrabri, Dubbo and Mudgee. Somewhat higher and cooler climates of similar character may also yield high infestations as at Inverell and Tamworth. When these same types of country are examined further south, infestation is in general much less, thus, on the South Western Slopes the infestation is under 10 per cent., except at Albury, where it was 22·4 per cent. Whilst in the Riverina two towns showed an absence of worm nests, four had an under 10 per cent. of infestation, Narrandera 10·8, and Corowa 14·3 per cent. It would, therefore, appear that the high western type of country, whether on the slopes or the inland plains, and the moister coastal climate both offer better facilities for worm-nest infestation in the north of the State than in the south. To a certain extent the southern parts of these districts are cooler than the northern. Another explanation may possibly be in the distribution of the rainfall, summer rains being experienced in the northern part of the State, and winter rains in the southern.

WORM NESTS.

Upper North Coast District.

This district is relatively low with scattered mountain ranges, the vegetation is dense and frequently bushy, the climate is mild, the winter is relatively dry most of the rain falling in summer. March flies are numerous.

In Bulletin No. 2 of the Advisory Council is recorded the occurrence of worm nests in the Murwillumbah and Richmond River districts, the incidence being light. The following results have been obtained :—

Murwillumbah :—

Dairy W.—At Condong, 2½ miles from Murwillumbah; open, swampy country with few trees and creeks; 13 locally bred cattle examined; 13 locally bred, nil.

Dairy 2.—North Arm, 3 miles from Murwillumbah; on the side of hills with much timber and several creeks; 36 cows examined; 29 locally bred, nil; 7 locally bred showed nodules as follow :—Pea, left rib; 4 marbles, right neck; walnut, left brisket; marble, left brisket; marble and walnut, left ribs; marble, left neck; 5 peas and 1 marble, left neck; 4 peas and marble, right ribs; pea, right neck; marble, left neck (23).

Total cows examined 49, all locally bred, of which 7 cows had 23 palpable worm nests.

Bangalow :—

Dairy 1.—St. Helena, 5 miles from Bangalow, 4 miles from Byron Bay; country gently sloping at a high level, a few trees and many small creeks; 24 cows examined—23 cows locally bred, nil; 1 cow locally bred showed 3 peas right side of the neck (3).

Dairy 2.—1 mile from Bangalow; flat and open country with few trees, 17 cows examined—16 locally bred, nil; 1 locally bred showed a pea-sized nodule on the left side of the neck and a small pea nodule on the front of the right brisket (2).

Total cows examined 41, all locally bred; in 2 cows 5 nodules were found.

Ballina :—

Dairy 1.—3 miles out, near coast, open paddocks, near thick scrub and creek; 40 cows examined—18 locally bred cows, nil; 22 cows, and with the exception of the last one which came from Eureka, locally bred, showed nodules as follow :—Walnut and marble, left ribs; 2 peas and walnut, right ribs; 4 marbles and walnut, left ribs; walnut left rib; marble, left rib; 6 marbles, right rib; pea, right rib; pea, left rib; walnut and 2 marbles and 2 peas, right rib; egg, right brisket; marble, left brisket; 4 marbles, left rib; marble, right rib; 2 peas, left rib; 2 marbles, right brisket; pea, left rib; walnut, right brisket; marble, left rib; walnut, right brisket; pea, right rib; walnut right rib; walnut, right brisket; marble, right rib; marble, left rib; pea, left rib; marble, right shoulder; pea, left brisket; marble, right neck; pea, right rib; 2 walnuts, 1 marble, left rib; marble, right brisket; walnut, left brisket; pea, left rib; pea, left rib; 2 marbles, right ribs; 2 marbles, left rib; egg, right rib (61).

Dairy 2.—Cumbalum, 5 miles from Ballina, gently sloping hills with creek and trees; 36 cows examined—26 locally bred, nil; 10 locally bred showed the presence of nodules as follow :—2 marbles, right rib; marble, right side; marble, left side; 2 marbles, right neck; pea, right side; marble, right neck; 2 marbles and pea, right neck; pea, right rib; marble, right shoulder; pea, right neck; pea, right neck; marble, left neck; marble, right rib; 2 peas, right neck; 1 pea, left neck (20).

Total cows examined 76, 75 locally bred; 1 from Eureka, 20 miles away. In 32 cows 81 nodules were found.

Lismore :—

Dairy 1.—Rifle Range, 2 miles out, gently sloping country with scattered trees and creek; 32 cows in herd; 25 cows examined—17 locally bred, nil; 8 locally bred showed the presence of nodules as follow :—5 peas, front brisket; pea, right neck; pea, right brisket; pea, right neck; 1 marble and 2 peas, right neck; 3 peas, right brisket; 2 marbles and 1 pea, left rib; marble, right rib; marble, right shoulder; walnut and marble, right brisket; 2 marbles, right rib; 1 marble, left rib (25).

Dairy 2.—Lagoon Grass, 4 miles from Lismore; open country, few trees, creek; 30 cows examined; 25 locally bred, nil; 3 locally bred showed the presence of nodules as follow :—2 marbles, right rib; pea, right rib; marble, brisket (4). Two from Dunoon, 20 miles away, showed the presence of nodules as follow :—Pea, right side; 2 marbles, right rib (3).

Total cows examined 55, 53 locally bred, 2 from Dunoon, 20 miles away. In 13 cows 32 nodules were found.

Casino :—

Dairy 1.—2¼ miles out on the Coraki Road; low-lying open country with scattered clumps of trees; near Horseshoe Lagoon; 35 cows in herd; 20 cows examined—17 locally bred, nil; 3 locally bred showed the presence of nodules as follow :—Marble, right brisket (?); pea, right brisket; egg, right brisket (3).

Dairy 2.—Wooroowoolgen, 4 miles from Casino; open low land, on banks of Richmond River, with trees and scrub. About 60 cows in herd. At this dairy milking machines were installed, and it was almost impossible to manually examine the cows. The following observations were made on the cows in the yard or shed with the help of Dairy Inspector W. G. Johnston :—6 locally bred cows showed the presence of nodules as follow :—Marble, right brisket; walnut, left brisket; marble, left brisket; pea, right brisket; marble, right brisket; 2 peas, left brisket (7); 1 cow from Big Scrub, marble, left brisket (1); 1 cow from Bruton, walnut, right brisket (1); 1 cow from Shannonbrook, several peas, right brisket.

Total cows examined 29, 26 locally bred. In 11 cows 12 nodules were found.

Mellanganee.—In a hollow between hills of Richmond Range (New England), with much timber and several creeks.

Dairy 1.—150 cows in herd. Milking machines were installed, so manual examination was not possible. Out of 60 cows which passed through the yard the following were observed :—12 locally bred cows showed the presence of nodules as follow :—3 marbles, right rib; marble, right brisket; marble, left shoulder; marble, right brisket; marble, right brisket; marble, left brisket; marble, right brisket; egg, right brisket; 2 marbles, right brisket; 2 marbles, left brisket; 2 marbles, right brisket; pea, right brisket; many marbles, right and left neck, and right and left brisket; marble, right brisket (18).

Dairy 2.—30 cows in herd; 23 cows examined—10 cows locally bred, nil; 13 cows locally bred showed the presence of the following nodules :—Marble, right brisket, 2 walnuts, right brisket; marble, left brisket; egg, right brisket; pea, right brisket; deep marble, left brisket (?); marble, right brisket; deep pea, right brisket (?); marble, right brisket; walnut, front brisket; marble, left brisket; marble, left brisket; marble, right brisket; marble, right brisket; pea, left brisket; pea, right brisket; pea, left brisket; marble, right brisket (19).

Total cows examined 83, all locally bred. In 24 cows 37 nodules were found; 1 cow showed many marbles right and left neck, and right and left brisket.

Middle North Coast.

North Dorrigo.—Basalt tableland; open country; visited 24th January, 1918.

Dairy 1 (Grace's Dairy).—Imperfectly examined owing to the bails; 5 cows examined—4 from Nambucca two (?) years ago, and 1 from Dorrigo. No worm nests detected.

Dairy 2 (R. Hutton's Dairy).—17 cows examined—13 locally bred, nil; 1 from Richmond River four years ago, nil; 3 locally bred showed nodules as follow :—Marble, right ribs; walnut and marble, right brisket; pea, right ribs (4). March flies rarely seen round farm. J. B. C. caught 2 tabanids 3 miles in, on granite, 500 feet lower near stream.

Summary.—Total cows examined 22, of which 14 locally bred showed no worm nests; 4 from Nambucca and 1 from Richmond River also showed no worm nests. In 3 locally bred cows 4 nodules were found.

Hunter and Manning (*Northern Coastal*).

Kendall—

Dairy 1.—20 cows examined 13th December, 1917; 4 cows showed nil; 16 cows showed nodules as follow :—Walnut, right ribs, walnut, left brisket, walnut and 2 marbles, left ribs; large and small marbles, left ribs; small marble, left ribs; walnut and marble, right ribs; 2 large peas, left ribs, 2 large peas, right ribs; walnut, right brisket small marble, right ribs, walnut, left brisket; marble, left brisket, 4 marbles, right brisket; large marble, left brisket; 2 marbles, left ribs; small and large marbles, left brisket; marble, left brisket; marble, front of belly; marble, right brisket; 3 marbles, right ribs, almond, left brisket, pea, left ribs; large marble, left brisket, marble, left ribs; 3 right ribs (40).

Dairy 2.—19 cows examined 23rd March, 1918—5 cows showed nil; 14 cows showed nodules as follow :—Pea, right, brisket, walnut, left brisket; large marble and walnut, right brisket; pea, right ribs; walnut, right brisket. marble left brisket; (?) marble, left brisket; pea in front of left shoulder, 2 marbles, left brisket; small pea, right ribs; large marble, left ribs, marble, right brisket, walnut deep in brisket; marble, right ribs; almond and marble, right ribs; 3 marbles, right brisket; pea on neck in front of right shoulder, walnut, back of left brisket; pea (?), gland, in front of right shoulder, marble and pea, right ribs, small marble, left ribs; 2 marbles, right ribs; walnut. right brisket (31).

Summary.—Total cows examined 39. In 30 cows 71 nodules were found.

N.B. Dairy 1.—This dairy is close to our Experiment Station at Kendall, and has been the chief source of flies submitted for examination. The examination of these cows was conducted in exactly the same way as for the other districts, and the heavy infestation of the Kendall cows is clearly shown in the results.

Hunter and Manning (*Western Coastal*).

Cows have been examined at Scone only. This district is traversed by the upper branches of the Hunter River the valleys being surrounded by moderately high hills. Fodder grows luxuriantly and much dairying is carried on. There is considerable timber at the foot hills and along the creeks. The two dairies examined are situated side by side. One consisted of a pure-bred Guernsey stock with the exception of one animal; these cows had been herd tested and comprised prize animals. The adjacent dairy, separated from this one by a fence alone, consisted of the usual mixed type of cows. The cows had come from Aberdeen a few miles away a year previously.

Scone—

Dairy 1.—Pure bred Guernsey herd, groomed daily, stall-fed in winter; in very good condition; *Stomoxys calcitrans* seen on one cow, March flies known in the district; 18 animals examined (15 cows and 3 bulls)—17 without worm nests of which 8 were locally bred; 2 bulls had been imported, 1 from America and 1 from England six years ago; 2 cows had been imported five years, and 5 cows had been imported four years; 1 cow locally bred showed the presence of a nodule the size of a walnut on the left rib (1).

Dairy 2.—Adjacent to Dairy 1 and 4 miles north of Scone; the cattle had access to the creek; the country is open, cleared and grassed; the cows were nearly all Jersey crosses, drab or lemon; all were said to have been bred in the Scone-Aberdeen district; 14 cows examined—9 cows bred in Scone or Aberdeen showed no worm nests; 5 cows similarly bred showed nodules as follow :—Small marble, left ribs; 2 marbles together, right ribs; 2 size of walnuts, right brisket, and 1 marble, right ribs; walnut, post. end of brisket; walnut, post. end of brisket (8).

Six cows locally bred showed 9 nodules.

South Coast (Illawarra).

Rich soil with subtropical brush, in great part cleared, well watered.

Thirroul, 2nd January, 1918—

Dairy 1.—26 cows examined; 22 cows locally bred and 3 from Camden, nil; 1 cow locally bred with worm nests—egg, side of left brisket (1).

Wollongong, 28th December, 1917—

Dairy 1.—23 cows examined; 16 cows locally bred and 3 from Camden, nil; 4 cows (3 locally bred and 1 from Camden) showed the following nodules—Pea, left ribs; walnut, left brisket; walnut, right brisket; (Camden), walnut, left brisket (4).

Dairy 2.—13 cows examined, all locally bred; 11 cows, nil; 2 cows showed the following nodules —2 marbles, right neck, marble behind left shoulder; walnut, right ribs, pea, left ribs (5).

Dairy 3.—24 cows examined, all locally bred—20 cows, nil; 4 cows showed the following nodules :—Marble, left ribs; walnut, left brisket, walnut, right ribs; marble, right ribs; pea, left ribs (5).

Berry, 4th January, 1918—

Dairy 1.—21 cows examined with no worm nests, only 7 of these being locally bred.

Dairy 2.—14 cows examined—8 cows locally bred, and 3 imported (Victoria, Inverell, Woodhill), nil; 3 cows locally bred showed the following nodules :—Pea, right ribs; (local ?), pea, left ribs; marble, left ribs (3).

Summary (Illawarra District).—121 cows examined, 14 with worm nests (17); 12 at least locally bred.

Northern Tableland (New England).

This high tableland is from 1,900 feet high at Inverell to 3,520 feet at Glen Innes. The highest point on the railway line is at Ben Lomond, 4,473 feet. The climate is dry and bracing.

Tenterfield.—High open country, mountains in the distance.

Dairy 1.—1 mile out; 20 cows locally bred, nil.

Dairy 2.—At Aldershot, 1½ miles out; 11 locally bred, nil.

Dairy 3.—2 miles out; 17 cows in herd—9 locally bred, nil; 2 from Sunnyside, nil; 1 from Tarbon, nil; 1 from Bolivia, nil; 1 from Demon Creek, 8 miles out, showed a pea in the right brisket (1); 1 from Sunnyside, pea left brisket (1); 1 from Richmond River, 2 marbles right brisket, pea left brisket (3).

N.B. March flies were very numerous at Tarbon and Demon Creek.

Dairy 4.—At Sunnyside, 7 miles from Tenterfield, 80 cows in herd. Milking machines were installed. No nodule were observed in the herd of which 6 were examined manually.

Total cows examined 62—55 locally bred, nil; 4 cows from surrounding districts, nil; 3 cows from surrounding districts, 5 nodules.

Glen Innes.—High open country, fair amount of timber—

Dairy 1.—3 miles out; 20 locally bred cows, nil.

Dairy 2.—3 miles out; 10 locally bred cows, nil.

Dairy 3.—2½ miles out; 13 locally bred cows, nil; 1 locally bred cow, pea, right rib (1).

N.B. In 1 cow Mr. Lacey (dairy inspector) observed a nodule, walnut size, two years ago; this has now disappeared; owner says last year. Total cows examined 44; 43 locally bred, nil; in 1 locally bred cow 1 nodule was found.

Inverell.—Undulating country with scattered clusters of trees—

Dairy 1.—2 miles out; 12 cows examined—9 cows locally bred, nil; 3 locally bred showed the presence of nodules as follow :—Marble, right brisket; marble, right brisket; 3 marbles, 1 pea, right brisket, 2 marbles, left brisket, 1 walnut, left brisket (9).

Dairy 2.—At Arrawatta, 10 miles out; 36 cows examined—19 locally bred, nil; 17 locally bred cows showed the presence of nodules as follow :—Marble, right brisket; walnut, right brisket; pea, left brisket; pea, right rib; egg, right brisket; ball, right rib; walnut, right brisket; marble, left brisket; 2 walnuts, right brisket; marble, right brisket; marble, left brisket; pea, left rib; marble, right brisket; walnut, right brisket; pea, left rib; egg, right rib; 2 marbles, right brisket (19).

Total cows examined 48, all locally bred, of which 20 cows had 28 nodules.

Armidale.—High undulating country with a few trees and creeks—

Dairy 1.—West Armidale; 10 locally bred cows examined, nil (0).

Dairy 2.—West Armidale; 10 cows examined—6 locally bred cows, nil; 4 locally bred cows showed the presence of nodules as follow :—Marble, left rib; marble, left rib; pea, left rib; pea, right rib (4).

Dairy 3.—3 miles east of Armidale; 26 cows examined—22 cows locally bred, nil; 4 cows locally bred showed the presence of nodules as follow :—Walnut, left rib; pea, left rib; marble, right rib; pea, right rib, marble, left brisket (5).

Dairy 4.—2 miles south of Armidale; 12 locally bred cows examined, nil (0).

Total cows examined 58, all locally bred of which 8 cows showed 9 nodules.

Central Tablelands.

Mudgee, 17th–18th December, 1917—

Dairy 1.—16 cows examined—10 locally bred and 1 from Camden, no worm nests; 5 locally bred showed the following nodules :—Pea, over right ribs, marble, right shoulder; marble, on middle of right neck; large marble, right brisket, small marble, right ribs; marble, right brisket; (?) deep nodule, right brisket (7).

Dairy 2.—11 cows examined—9 locally bred, no worm nests; 2 locally bred showed the following nodules :—Marble, back of brisket; 2 hen's egg, brisket, walnut, left ribs (4).

Dairy 3.—15 cows examined, all locally bred—12 showed no worm nests; 3 cows showed the following nodules :—Marble, left brisket; egg, left brisket; marble, behind right shoulder (3).

Dairy 4.—18 cows examined—10 locally bred and 2 imported, no worm nests; 6 cows (4 locally bred and 2 from Scone) showed the following nodules :—Walnut, right brisket; pea, right ribs; marble, near left brisket; large walnut, right brisket; from Scone, walnut, left brisket; from Scone, large marble, left ribs (6).

Eurenderee.—7 miles north of Mudgee; country more hilly; more timber about than near Mudgee—

Dairy 5.—18 cows examined—9 cows (8 locally bred and 1 from Forbes) showed no worm nests; 9 cows locally bred showed the following nodules:—Small marble, right brisket; 2 marbles, right ribs; walnut, front of brisket; walnut, back of brisket; egg, left brisket; walnut, right ribs, pea, left ribs; walnut, right brisket, marble, left brisket; walnut, back of brisket; marble, right brisket (12).

Dairy 6.—16 cows examined, all locally bred—6 cows showed no worm nests; 10 cows showed the following nodules:—Walnut, right brisket; pea, right ribs; marble, right ribs; walnut, right brisket; marble, left brisket; walnut, front brisket, walnut, left brisket; large marble, left brisket; marble, right brisket; egg, left brisket, pea, right ribs; 2 walnuts, right brisket (15).

Summary.—94 cows examined; 35 cows, mostly district bred, showed 45 nodules.

N.B. In connection with these Mudgee results it should be noted that the incidence of worm nests by manual palpation, was twice as great 7 miles away from the town as on the lucerne flats near the town. Proximity to the town and the denudation of timber may interfere with the prevalence of March flies near the town, but would do so less 7 miles in the country. Proximity to the town would not presumably interfere with the prevalence of crustaceans. These results therefore support the March fly theory.

Oberon District.—About 20th December, 1917—

19 locally bred cows examined by Mr. Griffith, Inspector of Blayney, no worm nests detected.

Bathurst.—19th December, 1917—

Dairy 1.—15 cows, locally bred, no worm nests.
Dairy 2.—20 cows, locally bred, no worm nests.

Both dairies within 2 miles of the town.

Blayney.—8th December, 1917—

Dairy 1.—18 cows examined, no worm nests; 15 cows locally bred, 3 from Camden.
Dairy 2.—10 cows examined, no worm nests; all locally bred.
Dairy 3.—14 cows examined, no worm nests; 7 locally bred, 7 from Camden.

Orange.—20th December, 1917—

Dairy 1.—26 cows examined, 23 locally bred, 3 from Camden—6 cows with nodules (locally bred):—Marble, left ribs, walnut, left brisket; marble behind left brisket; pea, left ribs; large walnut, right brisket; marble, front brisket pea, right ribs, marble, right brisket, 2 marbles, right shoulder (10).

Dairy 2.—20 cows examined, 18 locally bred, 2 from Mudgee; 1 cow from Mudgee showed a nodule, marble, right ribs (1).

Summary.—46 cows examined, of which 7 had 11 worm nests.

N.B. Dairy 1.—Most of these cows, perhaps all, had been out at grass for five months three years ago 15 miles away from Orange (near Mullion and Euchareena) where March flies were known to be very bad years ago, and are probably still plentiful.

Cowra Experiment Farm.—7th December, 1917—

15 cows examined, 6 with worm nests; four of the worm-nest infested cows had been bred at Wagga Experiment Farm, 2 of these having come to Cowra direct, the other 2 after being in the Lismore district. (Pure-bred Jersey herd.) The following nodules were detected:—Small subcutaneous nodule on back of right side of neck; walnut, right brisket, marble, right ribs, right neck in front of shoulder, 7 small subcutaneous worm nests (?); walnut, brisket; small marble, left ribs; small marble, left ribs; 2 walnuts, right brisket (16).

N.B. *Stomxys calcitrans* at Cowra round cows; March flies occasionally seen.
These findings suggest that cows can become infested occasionally with worm nests in the Cowra district.
Summary.—15 cows examined, 6 showing 16 nodules.

Southern Tablelands.

The country is hilly, creeks are numerous, though much of the country has been cleared there is still a good deal of timber. The winter season is cold and snow occasionally falls. The summer is relatively cool.

Cooma—

2 Dairies.—24 cows examined; 1 cow infected (from Bega) with marble in left brisket (1).

Queanbeyan—

2 Dairies.—44 cows examined; 2 cows infected, both locally bred, the nodules being distributed as follows:—1 marbles right rib; 1 marble, left brisket (2).

Goulburn—

5 Dairies.—85 cows examined; 4 cows infected (3 local, 1 imported); the nodules were distributed as follows:—(Local), marble, left brisket; (local), marble, right brisket; (imported), marble, right brisket; (local) walnut, right brisket, (4).

Yass—

1 Dairy.—23 cows examined; 1 locally bred cow infected with a nodule—pea, right ribs (1).

North Western Slope.

Tamworth.—Flat country surrounded by hills in the distance, much timber, and many creeks—

Dairy 1.—3 miles west of Tamworth; 24 cows examined; 14 locally bred—nil. 7 locally bred cows showed the presence of nodules as follow:—Marble, left rib; 3 marbles, left side; pea, left neck; pea, right rib; marble, right rib, 2 marbles and 1 walnut, left rib; marble and pea, left side; pea, right side; marble, left rib (14); 1 from New England, 4 peas, right rib, pea, left rib (5); 1 bought, marble, left brisket (1); 1 from Singleton, marble, left rib (1).

Dairy 2.—4½ miles west of Tamworth; 30 cows examined—12 locally bred, nil; 18 locally bred cows showed the presence of nodules as follow:—Walnut, left brisket; marble, right brisket; marble, right brisket; walnut, left brisket; marble, right and left brisket; marble, right brisket; pea, right rib; marble, right brisket; pea, left rib; walnut, right brisket; marble, right and left neck; walnut and marble, right brisket, marble, left brisket; marble, right neck; marble, right neck, pea, right shoulder, 2 peas, right side, pea, left side, marble, left shoulder; marble, right neck; 2 peas, left precrural, pea, left neck; 2 peas, right neck; ball, right rib; marble, right rib (31).

Dairy 3.—3 miles west of Tamworth; 20 cows examined—8 locally bred, nil; 12 locally bred cows showed the presence of nodules as follow:—Pea, right rib; pea, right rib; walnut, right rib, pea, precrural, ball, front brisket; marble, right brisket, marble, left brisket, walnut, left brisket; marble, left rib, 2 marbles, right brisket; pea, left brisket; egg, deep left brisket; egg, front brisket; marble, left precrural; pea, left rib; egg, right brisket (17).

Total cows examined 74; 37 locally bred showed 62 nodules; 3 from other districts (New England, Singleton, "bought") showed 7 nodules.

Boggabri, 1918.—Cows in three small dairies were examined at Boggabri. Worm nests were found in each, and amongst the cattle showing them were some which were said to be locally bred.

Dairy 1.—5 cows examined; 2 cows, nil; 3 cows (1 from Breeza, 1 from Coast, and 1 (?)) showed the following nodules:—Marble, right ribs; walnut, right ribs; walnut, right ribs (3).
Summary.—5 cows examined, 3 showing 3 nodules.

Central Western Slope.

Nearly flat country traversed by the Western River system; considerable belts of timber; climate in summer hot and dry.

Dubbo, 25th August, 1917—

Dairy.—2 miles outside town; 35 cows examined—24 cows unaffected; 11 cows with worm nests; most of these were bred on the farm, one or two from neighbouring farms within a few miles; probably there were none from outside the district. The nodules were distributed as follow:—(1) Small nest on side of ribs; (2) 1 size of large marble; (3, daughter of 2) 2 nests size of marbles, right ribs; (4) 1 size of small marble; (5) 1 brisket, size of mandarin orange; (6) 1 right ribs, size of mandarin orange; (7) 1 small, size of marble, left side; (8) 1 size of walnut on brisket; (9) 1 size of marble, left ribs; (10) 1 size of large walnut, deep in brisket; (11) brought as a calf from Waverley Dairy, Bondi, Sydney, 1 nest the size of walnut, left ribs (12).

South Western Slope.

This district comprises relatively flat country traversed by the Murrumbidgee and Murray Rivers with their stream of tributaries. On the eastern side are occasional hills, and though much of the country has been cleared, there are still exceedingly wooded parts, traversed by sandy ridges in places with a growth of pines. March flies seem known throughout the district.

Temora, 6th October, 1917—

Dairy 1.—In town, cows depastured near; 17 cows examined—14 cows without nodules, mostly locally bred, but not all; 1 cow, yellow Jersey, from Camden, bought off L. Donaldson, received with first calf, at Temora two years; the nodules were distributed as follow:—Bunch of 3 on left brisket; 1 marble, left ribs; 1 marble on right ribs; 1 marble deep in right brisket (6); 1 cow (?) from where, five years in district, 1 very small nodule over left ribs; 1 cow bred in district at Springdale, 12 miles out, 2 marbles on right ribs, do not roll, possibly injury (2).

Dairy 2.—2 miles in country which is open with scattered trees; 19 cows examined—17 cows without nodules, nearly all locally bred; 1 cow from Condobolin, bought off butcher, had it eighteen months, showed large nest size of small fist in brisket (1); 1 cow, probably locally bred, showed (?) diffuse nest deep under muscles, probably not (1).

Thirty-one cows, mostly local, all negative; 3 cows, introduced, positive (9 nodules); 2 cows, locally bred, doubtful.

Junee, 5th October, 1917.—March flies are said to be few in this district, but are known. The three dairies examined were in the town. There is no river within a number of miles. Running water is probably relatively scarce.

Dairy 1.—10 cows, all negative, all locally bred.

Dairy 2.—10 cows, all negative, all locally bred.

Dairy 3.—10 cows, all negative; 1 cow bought at Picton. One cow, bought at Picton, probably from the North Coast or Parramatta two years before, showed 1 worm nest the size of a walnut.

Thirty cows, locally bred, all negative; 1 cow (imported), positive (1 nodule).

Wagga Experiment Farm, 6th December, 1917—

Twenty-seven cows examined, 1 locally bred, 14 years old, with a single worm nest (marble over right ribs); pure-bred Jersey herd (1).

N.B. *Stomoxys calcitrans* very numerous, biting cows' legs.

Albury, 13th March, 1918.—Well-timbered undulating country on the Murray River—

Dairy 1.—2 miles out, on creek; 20 cows examined—5 were infected; 3 came from Victoria, and 2 were locally bred; the nodules were distributed as follow:—(1, Victoria), pea, right brisket; (2, Victoria), marble, right brisket; (3, Victoria), marble, right and left brisket; (4, local), pea, left brisket; (5, local), walnut, right brisket (6).

Dairy 2.—3 miles out, on river.—29 cows were examined—6 were infected, of these 2 came from Victoria, 2 were locally bred, and 1 was not known:—(1, Victoria). pea, right brisket; (2, Victoria), pea, right brisket; (3, Victoria), marble right brisket; (4, origin (?)), marble, left brisket; (5, local), marble and walnut, left brisket, marble, right brisket, (6, local), pea, right brisket (8).

Forty-nine cows were examined of which 11 (7 locally bred and 7 imported) were infected, showing 14 nodules.

North Western Plains.

This district comprises flat country traversed by the Gwydir and Namoi Rivers. The ground chiefly consists of plains, many of which are black soil plains, much of it is cleared with belts of timber in between. March flies are known in the district, but do not seem to be specially numerous. The temperature is hot and dry in summer, cold and frosty in winter; the rainfall is chiefly monsoonal.

Moree, 25th October, 1917—

Dairy 1.—2 miles south of the town on open black soil country, the cows being kept in the adjacent paddocks; the dairy is about a mile from the creek or river which runs through the town; the proprietor had seen March flies about; 21 cows examined—9 were without nodules, of these 1 was locally bred, 7 had come from Delungra, 30 miles west of Inverell within the last one to four years, and 1 had come from the Northern rivers ten years previously; 12 cows showed nodules. of these 5 were locally bred, 4 came from Delungra, 2 from Gravesend, 33 miles east of Moree, and 1 from Inverell; the nodules were distributed as follow:—(Local), walnut, left ribs; (local), 2 almonds, left ribs, 2 almonds, right ribs; (local), 2 marbles, right ribs, 1 marble, left ribs; (local), marble, right ribs; (local) marble, deep in brisket; (from Delungra), 3 small marbles over left ribs, at Moree three years; (from Delungra, at Moree one year), walnut, right brisket, marble, left ribs; (from Delungra, at Moree one year), 2 marbles, right ribs; (from Delungra, at Moree one year), 3 marbles, right ribs, 3 walnut and marbles, left ribs; (from Gravesend at Moree eighteen months). marble, brisket; (Gravesend, at Moree one year), walnut, left rib; (Inverell, at Moree five years), marble, left ribs (26).

Dairy 2.—2 miles north-west of Moree, surrounded by timber and water holes; 19 cows examined—13 cows showed no nodules, of which 8 were locally bred and 5 had been bought; 6 showed nodules, of these 1 was known to be locally bred, but the birthplaces of the others were doubtful; the nodules were distributed as follow:—(?) (local), marble, left ribs; (local), walnut, almond, right ribs; marble, right ribs; (?) (South Coast district), walnut, right brisket, 2 marbles, right ribs; (Singleton district), walnut, right brisket, 2 marbles, right ribs, almond, left rib; (Delungra), walnut, right ribs (12).

Eighteen cows showed 38 nodules.

Narrabri, 26th and 27th October, 1917—

Dairy 1.—In the town, the cows being pastured in the adjacent fields; 4 cows examined; 2 showed no nodules, 1 being locally bred and 1 bought; 2 showed nodules, 1 having been bred 4 miles out, and the other being probably locally bred also; the nodules were distibuted as follow:—(?) (Local), marble, right ribs; (4 miles out), marble, right ribs (2).

Dairies 2, 3 and 4.—5 cows examined—2 without nodules; 3 with worm nests, of which 1 was locally bred, 1 almost certainly locally bred, and 1 from Boggabri, being three years in Narrabri; nodules were distributed as follow:—(?) (Local), walnut, left brisket; (local), walnut, right ribs, pea, left ribs; (from Boggabri), walnut, right brisket, marble, left ribs (5).

Dairy 5.—West Narrabri, in proximity to the river, numerous forest trees in the neighbourhood; 25 cows examined—14 without nodules, of which 13 were bred locally or in the immediate neighbourhood, and 1 was bred at Eulah Creek, about 10 miles away; 11 cows showed nodules of which 10 were locally bred, and 1 came from the South coast; the nodules were distributed as follows:—(Local), walnut, right brisket; walnut, right brisket, egg, left brisket; walnut and pigeon egg, brisket, 3 marbles, left ribs; (Pilliga Scrub, 6 miles off), 3 walnuts, right ribs, 3 walnuts, left ribs; marble, left brisket; marble, right ribs; bantam's egg, left rib; marble, right ribs; walnut, back of brisket; 2 walnuts, right brisket; (South Coast), walnut. left ribs, 2 walnuts, right brisket, 2 large marbles, right ribs (26).

Dairy 6.—West Narrabri, near the river, large trees numerous; 3 cows examined—3 cows, all locally bred, with worm nests distributed as follow:—Walnut, right brisket; walnut, left brisket; walnut and marble, right ribs, marble, left ribs (5).

Dairy 7.—West Narrabri, near the river and amongst big trees; 18 cows examined—7 cows without worm nests, of which 6 were locally bred, and 1 came from Maitland (?); 11 cows with worm nests, of which 5 were locally bred, 1 came from Boggabri (?); 3 from the South Coast (?), and 1 from Maitland (?), but all with the exception of 1 had been five or six years at least in Narrabri; the nodules were distributed as follow:—(Local), marble, right ribs; (local), walnut, right brisket; (local), walnut, left brisket, marble, left ribs; (local), walnut, right brisket; (local), walnut, back of brisket; (South Coast (?)), walnut and marble right ribs, walnut, left brisket; South Coast (?)), walnut, left brisket; South Coast (?)) almond right ribs, marble, left ribs; (Maitland (?)), marble, right ribs; (Boggabri (?)), almond, left ribs; (?) (district), marble right ribs (15).

Dairy 8.—8 miles out; 3 without worm nests, of which 2 were locally bred, and 1 was from the Hunter River; 5 showed worm nests, of these 1 was locally bred, and the other 4 were probably locally bred; the nodules were distributed as follow:—(? Locality), almond, right ribs; (? locality), almond, right brisket, 2 pigeon eggs in left brisket, almond, left ribs; (? locality), bantam's egg, right brisket, marble, right ribs; (? locality), 2 walnuts, right ribs, 2 walnuts brisket, 2 walnuts, left ribs; (local), 2 walnuts and 5 marbles, right ribs, 1 marble, left ribs (21).

Thirty-five cows with nodules showed 94 worm nests.

Central Western Plains.

Warren, 29th May, 1918.—Open country with scattered belts of timber, large red gums on the river; March flies said to be known, but not numerous—

Two cows and 1 calf examined; 1 cow and 1 calf not infected; 1 cow, born at bore, 12 miles along the Coonamble road, and bred at Warren showed the following nodules:—2 walnuts, right brisket, 1 almond, right brisket, 1 almond, left brisket, 1 pea, right ribs (5).

Riverina.

Narrandera, 28th February, 1918—

Dairy 1.—2 miles out, near the river; country thickly timbered and flat; 15 cows examined, all locally bred; 4 cows showed nodules which were distributed as follow: Marble, right brisket; marble, left brisket, pea, left brisket; marble, right ribs; marble, right ribs, marble, right ribs (6). (1 nodule, now the size of a marble, was the size of an egg one and a half years ago).

Dairy 2.—2½ miles out; flat open country, lightly timbered; 16 cows examined; 1 cow infected (from Victoria) showed a nodule on the left brisket (1).

Dairy 3.—4 miles out; flat and open country with few trees; 9 cows examined none infected.

Dairy 4.—1 mile out, on the edge of the town; 6 cows examined, none infected.

Forty-six cows examined, mostly locally bred, of which 5 were infected with nodules, 7 being detected; 1 of the infected animals was imported from Victoria.

Leeton, 1st March, 1918—

Dairy 1.—4½ miles out; country flat and open, few trees, near a canal; 20 cows examined—2 cows infected, 1 of which came from the South Coast five years ago; the nodules were distributed as follow:—2 marbles, right brisket; walnut, right brisket (3).

Dairy 2.—5 miles out, similar country to Dairy 1; 8 cows examined; 2 cows infected as follow:—Ball, front brisket; walnut, front brisket (2).

Dairy 3.—3 miles out; 14 cows examined, none of which were infected.

Forty-two cows examined, 4 infected with worm nests (1 of which came from the South Coast five years previously) showing 5 nodules.

Hay, 4th March, 1918.—Open, flat country, thickly timbered, near the river—

Dairy 1.—4 miles out, near the river; 13 cows examined, none infected (2 from the North Coast, the remainder locally bred).

Dairy 2.—3 miles out, near the river; 6 cows examined, none infected.

Dairy 3.—11 cows examined—2 cows infected, both purchased about two years ago either at Goulburn or South Coast; the nodules were distributed as follow:—Pea, front brisket, marble, left brisket, pea, left neck; marble, left brisket (4).

Thirty cows examined, 2 cows infected, both imported from either Goulburn or South Coast two years ago, showing 4 nodules.

Deniliquin—

Dairy 1.—4 miles out, flat and open country with scattered timber; 15 cows examined, none infected.

Dairy 2.—2 miles out, near thick timber; 7 cows examined, none infected.

Dairy 3.—2½ miles out; 8 cows examined—2 infected with worm nests, which were distributed as follow:—Walnut, right brisket; pea, right neck (2).

Dairy 4.—4 miles out, beside the river; country thickly timbered; 6 cows examined, none infected.

Dairy 5.—In the town; 5 cows examined, none infected.

Dairy 6.—In the town; 12 cows examined—1 infected with a marble, left brisket (probably imported from Victoria) (1)

Fifty-three cows examined, of which 3 were infected, showing 3 nodules.

Finley.—Flat, plain country, lightly timbered, with no creeks—

Dairy 1.—7 miles out; 7 cows examined, all locally bred, none infected.

Dairy 2.—8 miles out; 9 cows examined, all locally bred, none infected.

Dairy 3.—2 miles out; 6 cows examined, all locally bred, none infected.

Dairy 4.—In town; 7 cows examined, all locally bred, none infected.

Twenty-nine cows examined, none of which were infected; all were locally bred.

Berrigan.—Level plain, pine country, with no creeks—

Dairy 1.—3 cows examined, all locally bred, none infected.

Dairy 2.—3 miles out, country showing fairly thick growth of pines; 6 cows examined, all locally bred, none infected.

Nine cows examined, all locally bred, none infected with nodules.

Corowa, 11th March, 1918.—Flat country on the banks of the Murray river, moderately thickly timbered—

Dairy 1.—16 cows examined—3 were infected (none locally bred); the nodules were distributed as follow:—(Wangaratta, Victoria), pea, right brisket; (Albury), marble, right brisket; (? locality), marble, left brisket, walnut, right brisket (4).

Dairy 2.—7 cows examined; 1 infected.

Dairy 3.—5 cows examined, all locally bred, none infected.

Twenty-eight cows were examined, of which 4 imported cows showed nodules.

Culcairn, 12th March, 1918.—Level country, lightly timbered—

Dairy 1.—1½ miles out, near a creek; 9 cows examined—2 were infected, both locally bred; the nodules were distributed as follow:—Marble, left brisket; marble, left brisket.

Dairy 2.—3 miles out; 18 cows examined, none infected.

Dairy 3.—3 miles out, on creek; 10 cows examined, none infected.

Thirty-seven cows were examined of which 2 cows, locally bred, showed 2 nodules.

[13 Graphs.]

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